

This Class 549 is considered to be an integral part of Class 260 (see the Class 260 schedule for the position of this Class in schedule hierarchy). This Class retains all pertinent definitions and class lines of Class 260.

ORGANIC COMPOUNDS (CLASS 532, SUBCLASS 1)
.HETEROCYCLIC CARBON COMPOUNDS CONTAINING A HETERO RING HAVING CHALCOGEN (I.E., OXYGEN, SULFUR, SELENIUM, OR TELLURIUM) OR NITROGEN AS THE ONLY RING HETERO ATOMS (Class 540, subclass 1)

1 ..Sulfur containing hetero ring (e.g., thiiranes, etc.)
2 ...With preservative or stabilizer
3 ...Heavy metal or aluminum containing
4 ...Boron or silicon containing
5 ...Phosphorus attached directly or indirectly to the hetero ring by nonionic bonding
6The hetero ring is five-membered
7Plural ring hetero atoms in the hetero ring
8Four chalcogens bonded directly to the same phosphorus
9 ...The hetero ring has at least seven members
10Plural ring hetero atoms in the hetero ring
11Plural ring sulfurs in the hetero ring
12 ...Polycyclo ring system having at least three cyclos and having the hetero ring as one of the cyclos
13 ...The hetero ring is six-membered
14Plural ring hetero atoms in the hetero ring
15Polycyclo ring system having the hetero ring as one of the cyclos

16Tricyclo ring system having the hetero ring as one of the cyclos
17Plural ring sulfurs in the hetero ring
18Three or more ring hetero atoms in the hetero ring
19Plural ring sulfurs in the hetero ring
20Two ring sulfurs in the hetero ring
21Chalcogen or nitrogen attached directly to the hetero ring by nonionic bonding
22Chalcogen or nitrogen attached indirectly to the hetero ring by nonionic bonding
23 ...Polycyclo ring system having the hetero ring as one of the cyclos
24The polycyclo ring system has at least four cyclos
25Chalcogen attached directly to the hetero ring by nonionic bonding
26Tricyclo ring system having the hetero ring as one of the cyclos
27Chalcogen attached directly to the hetero ring by nonionic bonding
28 ...Chalcogen or nitrogen attached directly to the hetero ring by nonionic bonding
29 ...The hetero ring is five-membered
30 ...Plural ring hetero atoms in the hetero ring
31Polycyclo ring system having the hetero ring as one of the cyclos
32Bicyclo ring system having the hetero ring as one of the cyclos
33Chalcogen attached directly to the hetero ring by nonionic bonding
34Three or more ring hetero atoms in the hetero ring
35Two ring sulfurs in the hetero ring

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| 36 |Chalcogen bonded directly to ring carbon of the hetero ring | 53 |Chalcogen attached directly to ring sulfur of the hetero ring by nonionic bonding |
| 37 |Nitrogen or chalcogen attached indirectly to the hetero ring by nonionic bonding | 54 |Plural chalcogens bonded directly to the bicyclo ring system |
| 38 |Nitrogen attached directly to the hetero ring by nonionic bonding | 55 |Nitrogen attached directly or indirectly to the bicyclo ring system by nonionic bonding |
| 39 |Chalcogen attached indirectly to the hetero ring by nonionic bonding | 56 |Halogen attached directly or indirectly to the bicyclo ring system by nonionic bonding |
| 40 |Chalcogen attached directly to ring sulfur of the hetero ring by nonionic bonding | 57 |Nitrogen or a $-C(=X)-$ group, wherein X is chalcogen, attached directly to the bicyclo ring system by nonionic bonding |
| 41 |Polycyclo ring system having the hetero ring as one of the cyclos | 58 |Chalcogen attached indirectly to the bicyclo ring system by nonionic bonding |
| 42 |Tetracyclo ring system having the hetero ring as one of the cyclos | 59 | ...Additional hetero ring containing |
| 43 |Tricyclo ring system having the hetero ring as one of the cyclos | 60 |Ring oxygen in the additional hetero ring |
| 44 |Chalcogen attached directly to the tricyclo ring system by nonionic bonding | 61 | ...Cyano bonded directly to the hetero ring |
| 45 |Chalcogen attached directly to the hetero ring by nonionic bonding | 62 | ...Chalcogen bonded directly to ring carbon of the hetero ring |
| 46 |Chalcogen attached directly to ring sulfur of the hetero ring by nonionic bonding | 63 |Nitrogen attached directly to the hetero ring by nonionic bonding |
| 47 |Halogen attached directly to the tricyclo ring system by nonionic bonding | 64 |Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the hetero ring |
| 48 |Nitrogen attached directly or indirectly to the tricyclo ring system by nonionic bonding | 65 |Nitrogen attached indirectly to the hetero ring by nonionic bonding |
| 49 |Bicyclo ring system having the hetero ring as one of the cyclos | 66 |Chalcogen attached indirectly to the hetero ring by nonionic bonding |
| 50 |Plural ring hetero atoms in the bicyclo ring system | 67 |Chalcogen attached directly to ring sulfur of the hetero ring by nonionic bonding |
| 51 |Chalcogen attached directly to the bicyclo ring system by nonionic bonding | 68 | ...Nitrogen attached directly to the hetero ring by nonionic bonding |
| 52 |Chalcogen attached directly to the hetero ring by nonionic bonding | 69 |Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the nitrogen |

70	....Having -C(=X)-, wherein X is chalcogen, bonded directly to the hetero ring	88	...The hetero ring is four-membered
71	.....The -C(=X)- is part of a -C(=X)X- group, wherein the X's are the same or diverse chalcogens	89	...Plural ring hetero atoms in the hetero ring
72	....Nitrogen or chalcogen attached indirectly to the hetero ring by nonionic bonding	90	...The hetero ring is three-membered and has chalcogen or nitrogen attached directly or indirectly thereto by nonionic bonding
73	....Halogen attached directly or indirectly to the hetero ring by nonionic bonding	200	..Oxygen containing hetero ring (e.g., dioxirane, etc.)
74	....Nitrogen attached indirectly to the hetero ring by nonionic bonding	201	...With preservative or stabilizer
75	....Chalcogen attached indirectly to the hetero ring by nonionic bonding	202	...Oxirane containing compound with preservative or stabilizer
76	.....The chalcogen, X, is in a -C(=X)- group	203	...Cyclic anhydride containing compound with preservative or stabilizer
77	.....Unsaturated carbocyclic ring or acyclic carbon to carbon unsaturation containing	204	...Lactone containing compound with preservative or stabilizer
78	....Chalcogen attached indirectly to the hetero ring by nonionic bonding	205	...Compound in which the hetero ring is five-membered with preservative or stabilizer
79	....The chalcogen, X, is part of a -C(=X)X- group, wherein the X's are the same or diverse chalcogens	206	..Heavy metal or aluminum containing
80	....Unsaturated carbocyclic ring or acyclic carbon to carbon unsaturation containing	207	...Arsenic containing
81	....Halogen attached directly to the hetero ring by nonionic bonding	208	...The hetero ring has three members or at least seven members
82	....Three or more halogens attached directly to the hetero ring by nonionic bonding	209	...The metal is bonded directly to carbon, which carbon is a ring carbon of the hetero ring or which carbon is attached directly or indirectly to the hetero ring by nonionic bonding
83	....The compound consists of the ring sulfur, carbon, and hydrogen	210	...The metal is bonded directly to chalcogen, which chalcogen is attached directly or indirectly to the hetero ring by nonionic bonding
84	....Process of forming the hetero ring from acyclic reactants only	211	.....The chalcogen, X, is part of a -C(=X)X- group, wherein the X's are the same or diverse chalcogens
85	.....Metal containing catalyst utilized	212	...Polycyclo ring system having the hetero ring as one of the cyclos
86	....Process of alkylating the hetero ring	213	..Boron containing
87	....Plural chalcogens double bonded directly to ring sulfur of the hetero ring	214	..Silicon containing
		215	...Oxirane ring containing
		216	...Phosphorus bonded directly to the hetero ring

- 217Oxirane ring containing
- 218 ...Phosphorus attached indirectly to the hetero ring by nonionic bonding
- 219Oxirane ring containing
- 220Polycyclo ring system having the hetero ring as one of the cyclos
- 221Plural ring oxygens in the hetero ring
- 222Chalcogen bonded directly to the hetero ring
- 223 ...Xanthene ring system having a benzene ring bonded directly thereto para to the xanthene ring oxygen, wherein the carbon of a -COO- group is bonded directly to the benzene ring ortho to its position of attachment to the xanthene ring system, and spirolactone derivatives thereof (e.g., fluoresceins, chlorofluorans, etc.)
- 224The xanthene ring system is three cyclos of a polycyclo ring system having at least four rings (e.g., benz(c)fluorans, etc.)
- 225Nitrogen bonded directly to the xanthene ring system (e.g., rhodols, aminofluorans, etc.)
- 226Plural nitrogens bonded directly to the xanthene ring system (e.g., 2,6 diaminofluorans, etc.)
- 227Rhodamines
- 228 ...The hetero ring contains -O-C(=X)-O- as part of its structure, wherein X is chalcogen (e.g., cyclic carbonates, etc.)
- 229The hetero ring is five-membered
- 230The five-membered hetero ring, except for the =X to the ring, is unsubstituted or hydrocarbyl substituted only
- 231 ...Cyclic anhydrides (i.e., -C(=X)OC(=X)-, wherein the X's are the same or diverse chalcogens, is part of the hetero ring)
- 232The cyclic anhydride has at least six members and is a cyclo in a polycyclo ring system
- 233The cyclic anhydride is five-membered (e.g., succinic anhydride, etc.)
- 234Polycyclo ring system having the cyclic anhydride as one of the cyclos
- 235Tetracyclo ring system having the cyclic anhydride as one of the cyclos
- 236Tricyclo ring system having the cyclic anhydride as one of the cyclos
- 237Two of the cyclos share at least three ring members (i.e., bridged)
- 238Halogen bonded directly to the tricyclo ring system
- 239Plural ring oxygens in the tricyclo ring system
- 240Bicyclo ring system having the cyclic anhydride as one of the cyclos
- 241Plural bicyclo ring systems each having the cyclic anhydride as one of the cyclos
- 242Having -C(=X)-, wherein X is chalcogen, bonded directly to at least one of the bicyclo ring systems
- 243Nitrogen or additional chalcogen bonded directly to the bicyclo ring system
- 244Having -C(=X)-, wherein X is chalcogen, bonded directly to the bicyclo ring system
- 245The -C(=X)- is part of a -C(=X)XH group, wherein the X's are the same or diverse chalcogens, or salt thereof (e.g., trimellitic anhydride, etc.)
- 246Halogen bonded directly to the bicyclo ring system
- 247Phthalic anhydride per se
- 248Preparing by oxidation
- 249Fluidized catalyst
- 250Purification or recovery
- 251By chemical reaction of impurity in presence of added chemical substance
- 252Plural hetero rings

- 253Nitrogen or additional chalcogen attached directly or indirectly to the cyclic anhydride by nonionic bonding
- 254Halogen attached directly or indirectly to the cyclic anhydride by nonionic bonding
- 255Acyclic carbon chain containing carbon to carbon unsaturation bonded directly to the cyclic anhydride
- 256Preparing by oxidation
- 257Of benzene or hydrocarbyl substituted benzene
- 258Of acyclic or alicyclic hydrocarbon
- 259Vanadium and phosphorus, in compound or elemental form, utilized
- 260Additional heavy metal, other than titanium, utilized
- 261Double bond between ring members of the cyclic anhydride
- 262Maleic anhydride per se
- 263 ...Lactones (i.e., $-C(=X)O-$, wherein X is chalcogen, is part of the hetero ring)
- 264Spiro
- 265The spiro includes the lactone ring
- 266The lactone ring has at least seven members
- 267Plural ring oxygens in the lactone ring
- 268Polycyclo ring system having the lactone ring as one of the cyclos
- 269Bicyclo ring system having the lactone ring as one of the cyclos
- 270Additional acyclic chalcogen bonded directly to the lactone ring (e.g., zearalanone, etc.)
- 271Additional chalcogen attached directly or indirectly to the lactone ring by nonionic bonding
- 272Preparing from a cyclic ketone (i.e., a ketone where the carbonyl is part of a ring)
- 273The lactone ring is six-membered
- 274Plural ring oxygens in the lactone ring
- 275Polycyclo ring system having the lactone ring as one of the cyclos
- 276Tetracyclo ring system having the lactone ring as one of the cyclos
- 277The tetracyclo ring system consists of four six-membered cyclos
- 278At least two additional chalcogens bonded directly to the tetracyclo ring system
- 279Ring oxygen bonded directly to ring carbon which is a member of two cyclos in the tetracyclo ring system
- 280Tricyclo ring system having the lactone ring as one of the cyclos
- 281Two of the cyclos share at least three ring members or ring carbon is shared by the three cyclos (e.g., bridged or peri compounds, etc.)
- 282Plural ring oxygens in the tricyclo ring system
- 283Bicyclo ring system having the lactone ring as one of the cyclos
- 284Plural bicyclo ring systems each having the lactone ring as one of the cyclos
- 285Additional acyclic chalcogen bonded directly to the lactone ring
- 286Benzene ring and the lactone ring bonded directly to the same acyclic carbon
- 287Acyclic $-C(=X)-$, wherein X is chalcogen, bonded directly to the lactone ring
- 288Nitrogen bonded directly to the bicyclo ring system
- 289The other cyclo of the bicyclo ring system is a six-membered carbocyclic ring to which chalcogen is directly attached
- 290The bicyclo lactone consists of two six-membered rings and is unsubstituted or hydrocarbyl substituted only

- 291Acyclic $-C(=X)-$, wherein X is chalcogen, bonded directly to the lactone ring
- 292Additional chalcogen bonded directly to the lactone ring
- 293Nitrogen attached directly or indirectly to the lactone ring by nonionic bonding
- 294Double bond between ring members of the lactone ring
- 295The lactone ring is five-membered
- 296Plural ring oxygens in the lactone ring
- 297Polycyclo ring system having the lactone ring as one of the cyclos
- 298Tetracyclo ring system having the lactone ring as one of the cyclos
- 299Tricyclo ring system having the lactone ring as one of the cyclos
- 300Two of the cyclos share at least three ring members or ring carbon is shared by the three cyclos (e.g., bridged or peri compounds, etc.)
- 301The tricyclo ring system consists of the lactone ring, a five-membered carbocyclic ring, and a three-membered carbocyclic ring
- 302Bicyclo ring system having the lactone ring as one of the cyclos
- 303Nitrogen bonded directly to the lactone ring
- 304Nitrogen attached indirectly to the lactone ring by acyclic nonionic bonding
- 305Chalcogen attached indirectly to the lactone ring by acyclic nonionic bonding
- 306Plural ring oxygens in the bicyclo ring system
- 307The other cyclo of the bicyclo ring system is benzene (e.g., phthalides, etc.)
- 308Two carbocyclic rings bonded directly to the same ring atom of the lactone ring
- 309Nitrogen bonded directly to each of the carbocyclic rings
- 310Additional chalcogen bonded directly to the bicyclo ring system
- 311The bicyclo ring system consists of two five-membered rings
- 312Acyclic carbon chain containing carbon to carbon unsaturation attached directly or indirectly to the lactone ring by nonionic bonding
- 313Additional chalcogen bonded directly to the lactone ring
- 314At least two additional chalcogens bonded directly to the lactone ring
- 315Double bond between ring members of the lactone ring or chalcogen double bonded directly at the 3- or 4-position of the lactone ring (e.g., ascorbic acid, etc.)
- 316Amine addition salts
- 317Sulfur or $-C(=X)-$, wherein X is chalcogen, bonded directly to acyclic chalcogen
- 318Acyclic $-C(=X)-$, wherein X is chalcogen, attached directly or indirectly to the lactone ring by nonionic bonding
- 319Plural alkyl groups bonded directly to the same ring carbon of the lactone ring (e.g., pantolactone, etc.)
- 320Plural hetero rings
- 321Nitrogen attached directly or indirectly to the lactone ring by acyclic nonionic bonding
- 322Having $-C(=X)$, wherein X is chalcogen, bonded directly to the lactone ring
- 323Chalcogen attached indirectly to the lactone ring by nonionic bonding
- 324Halogen attached directly or indirectly to the lactone ring by nonionic bonding
- 325Preparing by hydrogenation of cyclic anhydrides
- 326Preparing from compound containing $-COO-$ group
- 327Acyclic carbon double bonded directly to a ring carbon of a four-membered lactone ring

- 328Four-membered lactone ring formed
- 329From a ketene ($\text{HCH}=\text{C}=\text{O}$, wherein H may be substituted)
- 330 ...Spiro
- 331The spiro includes a hetero ring
- 332The spiro includes a three- or four-membered hetero ring
- 333Plural ring oxygens in a spiro hetero ring
- 334Both rings which form the spiro are hetero rings
- 335Two six-membered hetero rings, which each contain plural ring oxygens, form the spiro (e.g., spirobi-(meta-dioxane), etc.)
- 336Polycyclo ring system having one of the two rings which form the spiro as one of the cyclos
- 337Additional hetero ring containing
- 338Plural five-membered hetero rings
- 339Spiro ring is a cyclo in a tricyclo-carbocyclic ring system
- 340Acyclic $-\text{C}(=\text{X})-$, wherein X is chalcogen, containing
- 341The spiro hetero ring is five-membered
- 342Acyclic $-\text{C}(=\text{X})-$, wherein X is chalcogen, containing
- 343Both rings which form the spiro are hetero rings
- 344Polycyclo ring system having one of the two hetero rings which form the spiro as one of the cyclos
- 345Bicyclo ring system having the spiro hetero ring as one of the cyclos (e.g., griseofulvin, etc.)
- 346 ...The hetero ring has at least seven members
- 347 ...Plural ring oxygens in the hetero ring
- 348Polycyclo ring system having the hetero ring as one of the cyclos
- 349Tricyclo ring system having the hetero ring as one of the cyclos
- 350Bicyclo ring system having the hetero ring as one of the cyclos
- 351Three or more ring oxygens in the bicyclo ring system
- 352Three or more ring oxygens in the hetero ring
- 353Exactly four oxygens in the hetero ring
- 354 ...Polycyclo ring system having the hetero ring as one of the cyclos
- 355Bicyclo ring system having the hetero ring as one of the cyclos
- 356 ...The hetero ring is six-membered
- 357 ...Plural ring oxygens in the hetero ring (e.g., 1,2-dioxin, etc.)
- 358Polycyclo ring system having the hetero ring as one of the cyclos
- 359Tricyclo ring system having the hetero ring as one of the cyclos
- 360Two of the cyclos share at least three ring members (i.e., bridged)
- 361Three or more ring oxygens in the tricyclo ring system (e.g., actinospectacin, etc.)
- 362Bicyclo ring system having the hetero ring as one of the cyclos
- 363The two cyclos share at least three ring members (i.e., bridged)
- 364Three or more ring oxygens in the bicyclo ring system
- 365The ring oxygens are in the 1,2- or 1,3-positions of the hetero ring
- 366Nitrogen attached indirectly to the hetero ring by acyclic nonionic bonding
- 367Three or more ring oxygens in the hetero ring
- 368Trioxane per se
- 369The ring oxygens are in the 1,3-positions of the hetero ring (e.g., 1,3 dioxane, etc.)
- 370Plural hetero rings
- 371Nitrogen bonded directly to the hetero ring

- 372Chalcogen or $-C(=X)$,
wherein X is chalcogen, bonded
directly to the hetero ring
- 373Nitrogen attached
indirectly to the hetero ring
by nonionic bonding
- 374Chalcogen attached
indirectly to the hetero ring
by nonionic bonding
- 375The chalcogen, X, is in a
 $-C(=X)-$ group
- 376Preparing by reacting an
aldehyde with a compound
containing acyclic carbon to
carbon unsaturation
- 377The ring oxygens are in the
1,4-positions of the hetero
ring (e.g., 1,4 dioxane, etc.)
- 378Chalcogen attached directly
or indirectly to the hetero
ring by nonionic bonding
- 379Plural chalcogens bonded
directly to the hetero ring
- 380Halogen attached directly
or indirectly to the hetero
ring by nonionic bonding
- 381Polycyclo ring system having
the hetero ring as one of the
cyclos
- 382Pentacyclo ring system
having the hetero ring as one
of the cyclos
- 383Tetracyclo ring system
having the hetero ring as one
of the cyclos
- 384The tetracyclo ring system
consists of four six-membered
cyclos
- 385Tricyclo ring system having
the hetero ring as one of the
cyclos
- 386Two of the cyclos share at
least three ring members or
ring carbon is shared by the
three cyclos (e.g., bridged or
peri compounds, etc.)
- 387Plural ring oxygens in the
tricyclo ring system
- 388The tricyclo ring system
consists of three six-membered
cyclos (e.g., xanthene, etc.)
- 389Naphtho-pyrans (including
hydrogenated)
- 390Dibenzo(b,d)pyrans
(including hydrogenated)
- 391Plural chalcogens bonded
directly to the tricyclo ring
system
- 392Chalcogen bonded directly
to the hetero ring
- 393Having $-C(=X)-$, wherein X
is chalcogen, bonded directly
to the tricyclo ring system
- 394Nitrogen bonded directly
to the tricyclo ring system
- 395Acyclic chalcogen bonded
directly to the hetero ring
- 396Bicyclo ring system having
the hetero ring as one of the
cyclos
- 397The two cyclos share at
least three ring members
(i.e., bridged)
- 398The bicyclo ring system
consists of the hetero ring
and a six-membered carbocyclic
ring
- 399Chalcogen bonded directly
to the hetero ring
- 400Plural chalcogens bonded
directly to the hetero ring
- 401Chalcogen bonded directly
to the ring carbon para to the
ring oxygen (e.g., chromones,
etc.)
- 402Having $-C(=X)-$, wherein
X is chalcogen, bonded
directly to the hetero ring
- 403Benzene ring bonded
directly to the hetero ring
(e.g., flavones, etc.)
- 404Nitrogen bonded directly
to the bicyclo ring system
- 405Having $-C(=X)-$, wherein X
is chalcogen, bonded directly
to the bicyclo ring system
- 406Carbocyclic ring bonded
directly to the hetero ring of
the bicyclo ring system (e.g.,
flavanes, etc.)
- 407Chalcogen or nitrogen
attached indirectly to the
hetero ring by acyclic
nonionic bonding
- 408Chalcogen bonded directly
to the carbocyclic ring of the
bicyclo ring system (e.g.,
tocopherols, etc.)

- 409Chalcogen double bonded or plural chalcogens bonded directly to the carbocyclic ring (e.g., coenzyme Q, etc.)
- 410Chalcogen of a $-C(=X)X-$ group, wherein the X's are the same or diverse chalcogens, bonded directly to the carbocyclic ring of the bicyclo ring system (e.g., tocopherol esters, etc.)
- 411Preparing from 1,4-dioxygen substituted carbocyclic ring (e.g., of p benzoquinones, p-hydroquinones, etc.)
- 412Processes for chemical modification of substituents on the carbocyclic ring of the bicyclo ring system (e.g., alkylation of tocopherols, etc.)
- 413Purification or recovery
- 414Plural hetero rings
- 415Plural six-membered hetero rings
- 416Chalcogen bonded directly to the hetero ring
- 417Plural chalcogens bonded directly to the hetero ring
- 418Hydroxy bonded directly at the 3-position and oxygen double bonded directly at the 4-position of the hetero ring (H of $-OH$ may be replaced by a substituted or unsubstituted ammonium ion or a Group IA or IIA light metal)
- 419Nitrogen attached directly or indirectly to the hetero ring by acyclic nonionic bonding
- 420Having $-C(=X)-$, wherein X is chalcogen, attached directly or indirectly to the hetero ring by acyclic nonionic bonding
- 421Alicyclic ring bonded directly to the chalcogen
- 422Five-membered carbocyclic ring having the hetero ring as part of one substituent and $-COO-$ as part of another substituent (e.g., prostaglandin intermediates, etc.)
- 423Hydroxy or halogen attached directly or indirectly to the hetero ring by acyclic nonionic bonding (H of $-OH$ may be replaced by a substituted or unsubstituted ammonium ion or a Group IA or IIA light metal)
- 424Nitrogen bonded directly to the hetero ring
- 425Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the hetero ring
- 426Nitrogen attached indirectly to the hetero ring by nonionic bonding
- 427Chalcogen attached indirectly to the hetero ring by nonionic bonding
- 428Halogen attached directly or indirectly to the hetero ring by nonionic bonding
- 429 ...The hetero ring is five-membered
- 430Plural ring oxygens in the hetero ring
- 431Three or more ring oxygens in the hetero ring (e.g., ozonides, etc.)
- 432Polycyclo ring system having the hetero ring as one of the cyclos
- 433Tricyclo ring system having the hetero ring as one of the cyclos
- 434Bicyclo ring system having the hetero ring as one of the cyclos
- 435Plural hetero rings
- 436Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the bicyclo ring system
- 437Acyclic chalcogen bonded directly to the bicyclo ring system
- 438Having $-C(=X)-$, wherein X is chalcogen, attached indirectly to the bicyclo ring system by nonionic bonding
- 439Nitrogen bonded directly to the bicyclo ring system
- 440Nitrogen attached indirectly to the bicyclo ring system by nonionic bonding

- 441The nitrogen is bonded directly to a $-C(=X)-$ group, wherein X is chalcogen
- 442The nitrogen is attached directly to carbon by a double or triple bond
- 443Chalcogen attached indirectly to the bicyclo ring system by nonionic bonding
- 444The chalcogen, X, is in a $-C(=X)-$ group
- 445Chalcogen attached indirectly to the ring system by nonionic bonding
- 446The chalcogen, X, is in a $-C(=X)-$ group
- 447The $-C(=X)-$ is part of a $-C(=X)X-$ group, wherein the X's are the same or diverse chalcogens
- 448Plural hetero rings
- 449Nitrogen or chalcogen bonded directly to the hetero ring
- 450Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the hetero ring
- 451Nitrogen attached indirectly to the hetero ring by nonionic bonding
- 452The nitrogen is bonded directly to a $-C(=X)-$ group, wherein X is chalcogen
- 453Chalcogen attached indirectly to the hetero ring by nonionic bonding
- 454The chalcogen, X, is in a $-C(=X)-$ group
- 455Halogen attached directly or indirectly to the hetero ring by nonionic bonding
- 456Polycyclo ring system having the hetero ring as one of the cyclos
- 457Tetracyclo ring system having the hetero ring as one of the cyclos
- 458Tricyclo ring system having the hetero ring as one of the cyclos
- 459Two of the cyclos share at least three ring members (i.e., bridged)
- 460Dibenzofurans (including hydrogenated)
- 461Having $-C(=X)-$, wherein X is chalcogen, attached directly or indirectly to the tricyclo ring system by nonionic bonding
- 462Bicyclo ring system having the hetero ring as one of the cyclos
- 463The two cyclos share at least three ring members (i.e., bridged)
- 464Plural ring oxygens in the bicyclo ring system
- 465The bicyclo ring system consists of two five-membered cyclos
- 466Acyclic chalcogen bonded directly to the hetero ring
- 467Nitrogen attached directly or indirectly to the hetero ring by acyclic nonionic bonding
- 468Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the hetero ring
- 469Benzene ring bonded directly to the hetero ring
- 470Chalcogen of $-C(=X)X-$, wherein the X's are the same or diverse chalcogens, bonded directly to the carbocyclic ring of the bicyclo ring system
- 471Plural double bonds between ring members of the hetero ring
- 472Plural hetero rings
- 473Acyclic $-C(=X)-$, wherein X is chalcogen, attached directly or indirectly to the hetero ring by nonionic bonding
- 474Cyano bonded directly to the hetero ring
- 475Chalcogen bonded directly to the hetero ring
- 476Plural chalcogens bonded directly to the hetero ring
- 477Chalcogen double bonded directly to the hetero ring
- 478Having $-C(=X)-$, wherein X is chalcogen, attached directly or indirectly to the hetero ring by nonionic bonding

- 479Double bond between ring members of the hetero ring
- 480Nitrogen bonded directly to the hetero ring
- 481Nitro bonded directly to the hetero ring
- 482The hetero ring and an additional nitrogen are bonded directly to the same carbon
- 483Having $-C(=X)-$, wherein X is chalcogen, bonded directly to the hetero ring
- 484The $-C(=X)-$ is part of a $-C(=X)X-$ group, wherein the X's are the same or diverse chalcogens
- 485Plural $-C(=X)X-$ groups bonded directly to the hetero ring
- 486The carbon of the $-C(=X)X-$ group is bonded directly at the 3-position of the hetero ring
- 487Nitrogen bonded directly to the $-C(=X)-$ group
- 488Additional chalcogen attached indirectly to the hetero ring by nonionic bonding
- 489Preparation of furfural (i.e., furan-2-aldehyde)
- 490Purification or recovery of furfural
- 491Nitrogen attached indirectly to the hetero ring by nonionic bonding
- 492Nitrogen and the hetero ring are single bonded directly to the same acyclic saturated hydrocarbon group
- 493The nitrogen is bonded directly to a $-C(=X)-$ group, wherein X is chalcogen
- 494Having $-C(=X)-$, wherein X is chalcogen, attached indirectly to the hetero ring by nonionic bonding
- 495Chalcogen attached indirectly to the hetero ring by acyclic nonionic bonding
- 496Having $-C(=X)-$, wherein X is chalcogen, attached indirectly to the hetero ring by nonionic bonding
- 497Chalcogen attached indirectly to the hetero ring by nonionic bonding
- 498The chalcogen, X, is in a $-C(=X)-$ group
- 499The $-C(=X)-$ is part of a $-C(=X)X-$ group, wherein the X's are the same or diverse chalcogens
- 500Plural $-C(=X)X-$ groups attached indirectly to the hetero ring by nonionic bonding
- 501Additional chalcogen attached indirectly to the hetero ring by nonionic bonding
- 502Plural chalcogens attached indirectly to the hetero ring by nonionic bonding
- 503Preparing by hydrogenation of furfural
- 504Halogen attached directly or indirectly to the hetero ring by nonionic bonding
- 505Plural double bonds between ring members of the hetero ring
- 506Hydrocarbyl substituted
- 507One double bond between ring members of the hetero ring
- 508Preparing from compound containing $-COO-$ group
- 509Preparing from a hydroxy containing compound
- 510 ...The hetero ring is four-membered
- 511Sulfur or halogen attached directly or indirectly to the hetero ring by nonionic bonding
- 512 ...The hetero ring is three-membered consisting of one oxygen and two carbons
- 513Processes
- 514Epihalohydrin, glycerol monohalohydrin or glycerol dihalohydrin reactant
- 515Glycidyl ester formed by bonding the oxy of a $-COO-$ group directly to an acyclic carbon which is bonded directly to an oxirane ring

516	.....Glycidyl ether formed by bonding oxygen directly to an acyclic carbon which is bonded directly to an oxirane ring	537	.....Group IIA light metal containing material utilized
517	.....Phenolic ether formed	538	.....Purification or recovery
518	.....Oxirane ring formed	539	.....Ether or -COO- group formed
519	.....Carbonyl of aldehyde or ketone reacted to form oxirane ring	540	.....Isomerization, halogenation, hydrogenation, or dehydrohalogenation to form compound
520	.....By dehydrohalogenation of a halohydrin or by reacting a hypohalite or hypohalous acid with an ethylenically unsaturated compound at the site of unsaturation	541	.....Purification or recovery
521	.....Oxirane ring and chalcogen, cyano, nitrogen, or halogen are bonded directly to the same carbon (e.g., glycidyl ester formed, etc.)	542	.....By adsorption or by chemical reaction with impurity
522	.....Oxirane ring is unsubstituted or hydrocarbyl substituted only	543	....Polycyclo ring system having the hetero ring as one of the cyclos
523	.....Epoxidation at site of ethylenic unsaturation	544	....Tetracyclo ring system having the hetero ring as one of the cyclos
524	.....Liquid phase epoxidation	545	....Tricyclo ring system having the hetero ring as one of the cyclos
525	.....Organic peracid utilized	546	....Bicyclo ring system having the hetero ring as one of the cyclos
526	.....In situ formation of the organic peracid from carboxylic acid and hydrogen peroxide	547	.....Plural bicyclo ring systems each having a hetero ring as one of the cyclos
527	.....Epoxidizing unsaturated fat or fatty oil, or unsaturated derivative thereof	548	...Having -C(=X)-, wherein X is chalcogen, bonded directly to the hetero ring
528	.....Epoxidizing unsaturated fat or fatty oil, or unsaturated derivative thereof	549	....The -C(=X)- is part of a -C(=X)X- group, wherein the X's are the same or diverse chalcogens
529	.....Organic hydroperoxide reactant	550	...Cyano, nitrogen, or halogen bonded directly to the hetero ring
530	.....Boron containing catalyst utilized	551	...Nitrogen attached indirectly to the hetero ring by nonionic bonding
531	.....Hydrogen peroxide utilized	552	....Cyano or nitrogen and the hetero ring bonded directly to the same carbon
532	.....Air or molecular oxygen utilized	553	....The nitrogen is bonded directly to a -C(=X)- group, wherein X is chalcogen
533	.....Heavy metal containing catalyst utilized	554	...Chalcogen attached indirectly to the hetero ring by nonionic bonding
534	.....Silver containing catalyst utilized	555	....Chalcogen and the hetero ring bonded directly to the same carbon (e.g., glycidyl ethers, etc.)
535	.....Fluidized catalyst		
536	.....Additional heavy metal containing material utilized (e.g., promoter which contains heavy metal utilized, etc.)		

- 556Sulfur or $-C(=X)-$, wherein X is chalcogen, attached indirectly to the hetero ring by nonionic bonding
- 557The chalcogen, X, is part of a $-C(=X)X-$ group or a $-X-X-$ group, wherein the X's are the same or diverse chalcogens (e.g., $-COO-HCH-$ oxirane, etc.)
- 558Halogen attached indirectly to the hetero ring by nonionic bonding
- 559Carbocyclic ring containing
- 560Carbocyclic ring containing
- 561The chalcogen, X, is part of a $-C(=X)X-$ group, wherein the X's are the same or diverse chalcogens
- 562Additional $-C(=X)-$ or other sulfur attached indirectly to the hetero ring
- 563Halogen attached indirectly to the hetero ring by nonionic bonding

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