Polyatomic Compounds

Warm Up

Either state the name or write the formula for each ionic compound.

(a) Na₃P
(b) gold(I) oxide
(c) SnO₂

<u>Polyatomic Compounds</u>

Polyatomic Ions - groups of atoms that tend to stay together and carry an overall ionic charge.

Examples:

| NO ₃ - | (Nitr <u>ate</u>) |
|-----------------------------------------------|----------------------|
| <i>CO</i> ₃ - | (Carbon <u>ate</u>) |
| <i>C</i> <i>O</i> ₃ ⁻ | (Chlor <u>ate</u>) |

When these ions are combined with metals they form Polyatomic Compounds.

Examples:

NaNO₃- (Sodium Nitrate) NaCO₃- (Sodium Carbonate)

Where to find polyatomic ions

| | | | | | | | Table of C | ommon Pe | olyatomic I | cons | | | | | | | He |
|--------------------------|------------------------------------------|-----------------------------------------------------------------|------------------------------------|------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------|
| H hydrogen 1.01 | 2 | | | Key | | scotate (stherware) antimonium benchare | Chycoor NH4" Cyfrycoor | spanide | 0707 ² h | capitate dropes phosphate tydropes phosphate | PON ³⁷ HPON ²⁷ H2POn ² | 13 | 14 | 15 | 16 VIA | 17 VIIA | 4.00 |
| Li Entriann 6.94 | 4 16 3> Be berytliam 9.01 | most common ico other ico symbol eff (solids liquid | n charge 2+ | - Fe | - exercic of | torese carbale carbanate hydrogen carbanat perchionate chionate chionate | 003 ³ 02 ² 003 ¹ 004 004 005 | kodate rolaste rolaite oxalate | Ю3" н НО3" h НО2" н ООССОО ⁷ h НООССОО ⁷ h НООССОО ⁷ h | icate Alex disgon suffice disgon suffice disgon suffice coger suffice oxya taté | 503 ² 504 ² H504 ² H505 ² H505 ³ H505 ⁴ H505 ⁴ | 5 20 B barn 10.81 | C carbon 12.01 | 7 3- 3- M nikogen 14.01 | 8 2-4 2- 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 9 43 1- F Restice 19.00 | No 20.18 |
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| 19 | 20 | 11B | 1VB | VB | 24 17 | 25 | 26 | 27 | 18 | 29 | 30 12 | 31 | 32 10 | 33 | 34 | 35 20 | 35 |
| K potassiam 39.10 | Ca cateium 40.08 | Sc scandium 44.96 | ⁵ Ti Banium 47.87 | V sanadiam 50.94 | Cr chramium 52.00 | 54.94 | 55.85 | 56.93 | Ni sickel 58.69 | Cu 63.55 | Zn rise 65.41 | Ga galliam 69.72 | Ge 972.64 | As | Se relation 78.96 | Br branice 79.90 | BCF krypton 83.80 |
| 37 | 38 | 39 | 40 | 41 | 42 12 | 49 | 44 | 45 | 45 | 47 | 48 | 429 1.0 2+ | 50 2.0 4+ | 51 | 52 2.1 2- | 53 37 1- | 54 25 |
| Rb natisfiam 85.47 | Sr streetium 87.62 | Y strian 88.91 | Zr sircontan 91.22 | ³⁴ Nb ristiam 92.91 | Mo 95.94 | Tc technetium (98) | Ru retherium 101.07 | Rh rhedium 102.91 | Pd palladium 106.42 | Ag siteer 107.87 | Cd 112.41 | In indiam 114.82 | ² Sn 5n 118.71 | 5 Sb 121.76 | Te tellurium 12750 | icdine 126.90 | X@ xence 131.29 |
| 55 0.8 1. CS | 56 19 2. Ba bariam | 57 1.1 2* La Isethasen | Hf | Ta | W tangatee | Re | DS osmium | n 17 12.3 14. Ir isidian | 78 22 2.2 Pt platinum | 79 24 3+ 1+ gold | Hg Hg | 11 12 3- TI thalliam | 13 24 6 Pb Icad | 83 55 Bi | B4 20 32 45 PO pelorium | At astation | B5 |
| 132.91 | 137.33 | 138.91 | 178.49 | 180.95 | 183.84 | 186.21 | 190.23 | 192.22 | 195.08 | 196.97 | 200.59 | 204.38 | 207.2 | 208.98 | (209) | (210) | (222) |
| Fr franciam (223) | Ra | ¹¹ ² actinium (227) | Rf ruthenferdion (261) | Db (262) | Sg (266) | Bh bahrium (264) | Hs hassian (277) | Mt (268) | Ds derrestettion (281) | Rg (272) | Uub | Uut | Uuq | Uup | Uuh | Uus | Uuo |
| | Metals Seni-re Normeta | | | Ce cerian | 50 51 3- Pr prasocodymicer | 60 11 3- Nd 144.24 | Pm promotions (145) | 62 22 Sm sumaria 150.3 | 63 2. Eu earspion 151.96 | Gd saddinium 157.25 | 65 3+ Tb torbian 158.93 | 66 1.3 3. Dy dysprosium 162,50 | 67 12 32 Ho hotestam 164,93 | Er 12 35 Er 167.26 | 68 33 3- Tm thatiam 168,93 | 70 3. 2. Yb ytterbian 173.04 | 71 33 3- Lu hetetisen 174.97 |
| | Nable Gr | 1 | | 140.12 | 140.91 | 144.24 52 | 93 | 94 | 95 | 157.25 | 158.93 | 162.50 | 50 | 167.26 | 168.93 | 1/3.04 | 1/4.9/ |
| | | 1 | | Th | Pa | E U | Np | E Pu | ² Am | Cm | Bk | Cf | Es | Fm | Md | 3 No | Lr |
| NELS | INOS | / | | fooriam 232.04 | 231.04 | 238.03 | equation (237) | (244 | emericiam (243) | (247) | hericolium (247) | (251) | einsteinium (252) | (257) | (258) | (259) | (262) |

I

| acetate (ethanoate) ammonium | CH ₃ COO ⁻ NH ₄ ⁺ | chromate | CrO4 ^{2⁻} Cr ₂ O7 ^{2⁻} | phosphate | PO4 ^{3⁻} HPO4 ² |
|---------------------------------|------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------|
| benzoate | C6H5COO- | dichromate cyanide | Cr207- | hydrogen phosphate dihydrogen phosphate | HPO4- H2PO4 |
| borate | BO3 ³⁻ | hydroxide | OH- | silicate | SiO32- |
| carbide | C22- | iodate | 103- | sulfate | s042- |
| carbonate | co32- | nitrate | NO3- | hydrogen sulfate | HSO4- |
| hydrogen carbonate | HCO3- | nitrite | NO2 | sulfite | so32- |
| perchlorate | CIO4 | oxalate | 0000002- | hydrogen sulfite | HSO3- |
| chlorate | CIO3- | hydrogen oxalate | H00CC00- | hydrogen sulfide | HS ⁻ |
| chlorite | CI02 ⁻ | permanganate | MnO ₄ ⁻ | thiocyanate | SCN ⁻ |
| hypochlorite | OCI ⁻ or CIO ⁻ | peroxide persulfide | 02^{2-} $S2^{2-}$ | thiosulfate | S2032 |

Steps to solving Polyatomic Compounds:

Step 1: Write the symbols of the metal and of the polyatomic group.

Na SO₄

Step 2: Write the ionic charges above the ions.



Step 3: Cross the ion charges to the opposing ions and drop the signs.



Step 4: Combine the ions together and get rid of any 1's.

Na₂SO₄

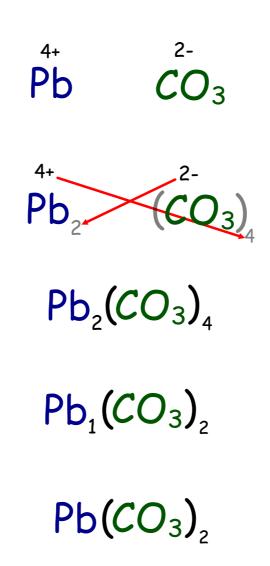
The name for this ionic compound would be...

Sodium Sulfate

Naming Polyatomic Ions

The name is simply a combination of the name of the metal and the name of the polyatomic ion. Try this one...

What is the chemical formula of lead(IV) carbonate?



Exit Question

What is the difference between an ionic compound (ex. NaCl) and a polyatomic compound (ex. H_2SO_4). How can you tell the difference by looking at the symbols and words?