CHAPTER 0

IONS & IONIC CHARGES

0.1 Indicate if the following chemical species represent an atom, and anion or a cation: (a) Fe^{2+} (b) Cl^- (c) Ag

0.2 Identify the ionic state of the following elements. If needed, indicate the existence of multiple ionic states: (a) H (b) O (c) N (d) F (e) Mn

0.3 Identify the ionic state of the following elements. If needed, indicate the existence of multiple ionic states: (a) Li (b) V (c) Cl (d) S (e) Cr (f) Sr (g) Ni

COVALENT COMPOUNDS

0.4 Name or formulate the following covalent compounds: (a) NO (b) Dichlorine monofluoride (c) NO_2

0.5 Name or formulate the following covalent compounds: (a) Chlorine Monofluoride (b) N_2O (c) Nitrogen trifluoride

0.6 Name or formulate the following covalent compounds: (a) SO_3 (b) Disulfur dichloride (c) SO_2 (d) Disulfur tetrachloride

0.7 Name or formulate the following covalent compounds: (a) P_4S_3 (b) Sulfur Tetrafluoride (c) As_2O_5 (d) Sulfur trioxide

IONIC COMPOUNDS

0.8 Classify the following chemicals in two groups, justifying your classification: (a) NaCl (b) CO_2 (c) $FeCl_3$ (d) N_2O_3 (e) SO_3 (f) Ca_3N_2

0.9 Combine the following ions:

(a) $Na^+ + Cl^-$
(b) $Na^+ + Se^{2-}$
(c) $Na^+ + P^{3-}$
(d) $Mg^{2+} + Cl^-$
(e) $Mg^{2+} + O^{2-}$
(f) $Mg^{2+} + N^{3-}$

0.10 Name or formulate the following ionic (Type I) compounds: (a) Magnesium iodide (b) Ca_3P_2 (c) Lithium nitride (d) MgF

0.11 Name or formulate the following ionic (Type I) compounds: (a) Magnesium fluoride (b) CaS (c) Barium phosphide (d) Mg_3N_2

0.12 Name the following compounds:

(a) NaCl
(b) Ca_3N_2
(c) MgI_2
(d) SrS
(e) RbCl
(f) KF

0.13 Combine the following ions:

(a) $Cs^+ + F^-$
(b) $Sr^{2+} + O^{2-}$
(c) $Be^{2+} + C^{4-}$
(d) $Li^+ + I^-$

0.14 Classify the following chemicals in two groups. Justify your classification.

(a) NaCl
(b) MnO_2
(c) $FeCl_3$
(d) SrO
(e) Li_3N
(f) NiO

0.15 Formulate the following compounds:

(a) Copper(I) oxide
(b) Copper(II) nitride
(c) Nickel(III) oxide
(d) Manganese(IV) oxide

0.16 Name the following compounds:

(a) NiO
(b) Cr_2O_3
(c) VO
(d) MnO_4

0.17 Formulate the following compounds:

(a) Iron(II) nitride
(b) Copper(I) sulfide
(c) Chromium(III) iodide
(d) Palladium(IV) phosphide
(e) Manganese(VI) oxide

0.18 Name the following compounds:

(a) Ni_2O_3
(b) Fe_3N_2
(c) Cr_2O_3
(d) Ni_3P_2
(e) Ru_2Se_3

0.19 Name the following compounds:

(a) FeO
(b) CrN
(c) ZnI_2
(d) CoS
(e) MnF_3
(f) Cu_2C
(g) Ag_2O

0.20 Name or formulate the following ionic (Type II) compounds: (a) Fe_3P_2 (b) Copper(II) iodide (c) Fe_3N_2 (d) Iron(II) sulfide

0.21 Name or formulate the following ionic (Type II) compounds: (a) Fe_2S_3 (b) Gold(III) chloride (c) FeO (d) Vanadium(V) nitride

0.22 Name or formulate the following ionic (Type II) compounds: (a) FeI_2 (b) Lead(IV) sulfide (c) $FeBr_2$

0.23 Name or formulate the following ionic (Type II) compounds: (a) Manganese(IV) oxide (b) $FeCl_2$ (c) Copper(I) oxide

Acids and hydroxides

0.24 Name or formulate the following acids or bases: (a) HCl (b) Hydrofluoric Acid (c) $Mg(OH)_2$

0.25 Name or formulate the following acids or bases: (a) Sulfuric Acid (b) H_2CO_3 (c) Lithium hydroxide

0.26 From the following chemicals identify acids and bases: (a) KOH (b) LiOH (c) CH_3OH

0.27 From the following chemicals identify acids and bases: (a) H_2SO_3 (b) NH_3 (c) $Ca(OH)_2$

0.28 From the following chemicals identify hydracids and oxoacids: (a) HF (b) H_2SO_3 (c) H_2S

0.29 From the following chemicals identify hydracids and oxoacids: (a) H_3BO_3 (b) HCl (c) HI

0.30 Working in pairs, memorize the following oxoacids:

(a) H_2SO_4 Sulfuric acid
(b) H_2CO_3 Carbonic acid
(c) $HMnO_4$ Permanganic acid
(d) HNO_3 Nitric acid
(e) H_3PO_4 Carbonic acid
(f) $H_2Cr_2O_7$ Dicromic acid

0.31 Identify the redox number of the central atom of the following oxoacids: (a) H_2CrO_4 (b) $H_2Cr_2O_7$ (c) $HMnO_4$

0.32 Identify the redox number of the central atom of the following oxoacids: (a) H_2MnO_4 (b) $HReO_3$ (c) H_2SiO_3

0.33 Identify the most oxidated acid:

(a) H_3AsO_4 or H_3AsO_3 (b) H_2XeO_4 or H_4XeO_6

0.34 Identify the most reduced acid:

(a) H_2RuO_4 or $HRuO_4$ (b) $HTcO_4$ or H_2TcO_4

0.35 Identify the most oxidant acid:

(a) $H_2S_2O_6$ or H_2SO_4 (b) H_2SeO_4 or H_2SeO_3

Naming of complex salts and common chemicals

0.36 Name or formulate the following oxoanions: (a) ClO_4^- (b) PO_4^{3-} (c) SO_4^{2-} (d) CO_3^{2-} (e) NO_3^- (f) CrO_4^{2-} (g) BO_3^{3-}

0.37 Name or formulate the following (Type I) oxosalts: (a) $Mg(NO_3)_2$ (b) Sodium permanganate (c) $KMnO_4$ (d) Calcium carbonate (e) Li_3PO_4

0.38 Name or formulate the following (Type I) oxosalts: (a) Lithium sulfate (b) Na_2CrO_4 (c) Lithium sulfite (d) $Cs_2Cr_2O_7$ (e) Calcium sulfate

0.39 Name or formulate the following compounds: (a) Na_2SO_4 (b) KNO_3 (c) $CaCO_3$ (d) $Ca(NO_2)_2$ (e) $SrSO_3$

0.40 Combine the following ions:

(a) $Na^+ + PO_4^{3-}$
(b) $Li^+ + MnO_4^-$
(c) $Mg^{2+} + NO_3^-$
(d) $Ca^{2+} + CO_3^{2-}$
(e) $Cs^+ + Cr_2O_7^{2-}$
(f) $K^+ + BO_3^{3-}$

0.41 Combine the following polyatomic ions:

(a) $Na^+ + NO_3^-$

(b) $Na^+ + CO_3^{2-}$

(c) $Na^+ + PO_4^{3-}$

(d) $Ca^{2+} + CO_3^{2-}$

(e) $Ca^{2+} + PO_4^{3-}$

0.42 Name or formulate the following (Type II) oxosalts: (a) $Cr_2(SO_4)_3$ (b) zinc(II) carbonate (c) $Fe(MnO_4)_3$

0.43 Name or formulate the following (Type II) oxosalts: (a) cobalt(III) carbonate (b) $Fe(ClO_4)_3$ (c) zinc(II) carbonate

0.44 Name or formulate the following hydrosalts: (a) $NaHCO_3$ (b) Calcium Hydrogencarbonate (c) $Al(HSO_4)_3$

0.45 Name or formulate the following hydrosalts: (a) Sodium dihydrogenphosphate (b) LiH_2PO_4 (c) Silver monohydrogenphosphate

0.46 Name or formulate the following hydrates: (a) $Al_2(SO_4)_3 \cdot 3\,H_2O$ (b) Silver phosphate dihydrate (c) $KMnO_4 \cdot 4\,H_2O$ (d) Lithium sulfate tetrahydrate

0.47 Name or formulate the following compounds: (a) $MgSO_4$ (b) $Ni(SO_4)_3$ (c) Cobalt(II) nitrate (d) Cobalt(II) sulfate dihydrate (e) $KHCO_3$

0.48 Name or formulate the following compounds: (a) $Ca(NO_3)_2$ (b) $Ca(HCO_3)_2$ (c) Nickel(II) sulfate (d) Nicke(II) sulfate tetrahydrate (e) NaH_2PO_4

0.49 Name or formulate the following compounds: (a) $MnSO_4$ (b) $CuNO_3$ (c) $Cr_2(CO_3)_3$ (d) $V(NO_2)_2$ (e) $FeSO_3$

0.50 Name or formulate the following pairs or ions: (a) carbonate and monohydrogencarbonate (b) sulfate and monohydrogensulfate (c) cromate and monohydrogenchromate (d) phosphate and dihydrogenphosphate (e) phosphate and monohydrogenphosphate (f) borate and dihydrogenphosborate