(1) Name each compound

Ionic

Cu_3N Copper (I) Nitride

MnS Manganese (II) Sulfide

PbO_2 LEAD (IV) Oxide

$HgCl_2$ Mercury (II) chloride

Molecular

S_3O_5 Trisulfur ~~di~~ Pentoxide

P_2F_5 Diphosphorous Pentafluoride

CO_2 Carbon DIOXIDE

N_4I_2 TETRANITROGEN DIODIDE

(2) What ions and name

$MgBr_2$ Magnesium Bromide

$Ba(NO_3)_2$ Barium ~~II~~ NITRATE

$Sn_3(PO_4)_2$ Tin (II) Phosphate

$Al_2(SO_4)_3$ Aluminum Sulfate

Cu_2CO_3 Copper (I) Carbonate

NH_4Cl Ammonium Chloride

FeI_2 Fe (II) Iodide (Iron)

$Pb(OH)_2$ LEAD (II) Hydroxide

(3) $C_5H_{10}O_5$ Molecular $C_{12}H_{22}O_{11}$ both $C_6H_{12}O_6$ Molecular H_2O_2 Molecular

$C_{12}H_{17}ON$ ~~empirical~~ both Na_3N empirical

(4) $K_3PO_4 = \cancel{134.07}\ 212.2$ g/mol

$10.0g\ K_3PO_4 \times \frac{1mol}{\cancel{134.07}\ 212.24\ g/mol} \times \frac{6.02\times10^{23}}{1mol} = \cancel{4.49\times10^{22}}\ 2.84\times10^{22}$ Formula Units

$Ca(NO_3)_2 = 164.1g/mol$ $10.0g \times \frac{1mol}{164.1g} \times \frac{6.02\times10^{23}}{1mol} = 3.67\times10^{22}$ Formula Units

$Al_2(SO_4)_3 = 342.14$ g/mol $10.0g \times \frac{1}{342.14} \times \frac{6.02\times10^{23}}{1mol} = 1.75\times10^{22}$ Formula Units

$(NH_4)_2(CO_3) = 96.11$ g/mol $10.0g \times \frac{1mol}{96.11g} \times \frac{6.02\times10^{23}}{1mol} = 6.26\times10^{22}$ Formula Units

Chart

CaO	$Ca(NO_3)_2$	$Ca_3(PO_4)_2$	$CaSO_4$
Al_2O_3	$Al(NO_3)_3$	$AlPO_4$	$Al_2(SO_4)_3$
~~H_2O~~	HNO_3	H_3PO_4	H_2SO_4

Balance $2PbO_2 \rightarrow 2PbO + O_2$

$4HCl + MnO_2 \rightarrow MnCl_2 + Cl_2 + 2H_2O$

$3KOH + H_3PO_4 \rightarrow K_3PO_4 + 3H_2O$

$2Al(NO_3)_3 + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 6HNO_3$

Complete & Balance

$Ca(NO_3)_2 + 2HCl \rightarrow CaCl_2 + 2HNO_3$

~~$BaCl_2 + HCl \rightarrow$~~

$BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$

% Composition

$Na_2S_2O_3$

$Na = 2 \times 22.99 = 46 / 142.05 = 32.3\%$

$S = 1 \times 32.07 = 32 / 142.05 = 22.5\%$

$O = 4 \times 16.00 = 64 / 142.05 = 45.0\%$

NH_4NO_3

$N = 2 \times 14.01 = 28.02 / 161.12 = 17.3\%$

$H = 4 \times 1.01 = 4.04 / 161.12 = 2.5\%$

$O = 3 \times 16.01 = 48.06 / 161.12 = 29.8\%$

$CaCl_2$

$Ca = 1 \times 40.08 = 40.08 / 110.98 = 36.1\%$

$Cl = 2 \times 35.45 = 70.90 / 110.98 = 63.9\%$

110.98

(D) Na_3PO_4

$Na = 3 \times 22.99 = 68.97 / 163.94 = 42.1\%$

$P = 1 \times 30.97 = 30.97 / 163.94 = 18.9\%$

$O = 4 \times 16.00 = 64.00 / 163.94 = 39.0\%$

163.94

WRITE THE Compound & Balance

1. $Al(NO_3)_3 + 3NaOH \rightarrow Al(OH)_3 + 3NaNO_3$
2. $CuCl_2 + K_2SO_4 \rightarrow 2KCl + CuSO_4$
3. $H_2CO_3 + Mg(OH)_2 \rightarrow MgCO_3 + 2H_2O$

Balance the following

1. $NaOH + HCl \rightarrow H_2O + NaCl$
2. $Pb(NO_3)_2 + 2NaCl \rightarrow PbCl_2 + 2NaNO_3$
3. $2Na_3PO_4 + 3CaCl_2 \rightarrow 6NaCl + Ca_3(PO_4)_2$

Calculate mole

1. $560g\ Br_2 \times \frac{1mol}{(2 \times 79.9)} = 3.50$ moles
2. $73.2g\ Mg \times \frac{1mole}{24.3g} = 3.01$ moles
3. $814g\ Ba(OH)_2 \times \frac{1mol}{171.35} = 4.75$ moles
4. $472g\ H_2O \times \frac{1mol}{18.02g} = 26.2$ moles
5. $86.6g\ CH_4 \times \frac{1mol}{16.05g\ CH_4} = 5.40$ moles
6. $8.25g\ CaCO_3 \times \frac{1mol}{100.01} = .082$ mole
7. $200.0g \times \frac{1mol}{101.96} = 1.961$ mole

Mass in grams

(1) $5.25\text{ mol ZnO} \times \frac{81.4}{1\text{ mol}} = 427.35\text{ g}$ $\quad 5.25\text{ mol} \times \frac{6.02\times10^{23}\text{ mol}}{1\text{ mol}} \times \frac{2\text{ atoms}}{1\text{ molc}} = 6.32\times10^{24}\text{ atoms}$

(2) $12.4\text{ mol HCl} \times \frac{36.46\text{ g}}{1\text{ mol}} = 452\text{ g}$ $\quad 12.4\text{ mol} \times \frac{6.02\times10^{23}}{1\text{ mol}} \times \frac{2\text{ atoms}}{1\text{ mole}} = 1.49\times10^{25}\text{ atoms}$

(3) $6.88\text{ mol } H_2SO_4 \times \frac{98.09}{1\text{ mol}} = 674.8\text{ g}$ $\quad 6.88\text{ mol} \times \frac{6.02\times10^{23}}{1\text{ mol}} \times \frac{7\text{ atoms}}{1\text{ mol}} = 2.90\times10^{25}\text{ atoms}$

(4) $7.5\text{ mol } C_6H_{12}O_6 \times \frac{180\text{ g}}{1\text{ mol}} = 1350\text{ g}$ $\quad 7.5\text{ mol} \times \frac{6.02\times10^{23}}{1\text{ mol}} \times \frac{24\text{ atoms}}{1\text{ molecule}} = 1.08\times10^{26}\text{ atoms}$

(5) $205\text{ mol } Al_2O_3 \times \frac{101.96\text{ g}}{1\text{ mol}} = 20{,}901.8\text{ g}$ $\quad 205 \times \frac{6.02\times10^{23}}{1\text{ mol}} \times \frac{5\text{ atoms}}{1\text{ mole}} = 6.2\times10^{26}\text{ atoms}$

(6) $42.7\text{ mol } Na_2CO_3 \times \frac{105.99\text{ g}}{1\text{ mol}} = 4525.8\text{ g}$ $\quad 42.7\text{ mol } Na_2CO_3 \times \frac{6.02\times10^{23}}{1\text{ mol } Na_2CO_3} \times \frac{6\text{ atoms}}{1\text{ molecule}} = 1.54\times10^{26}\text{ molecules}$

(7) $80.3\text{ mol } CH_4 \times \frac{16.05\text{ g}}{1\text{ mol}} = 1288\text{ g}$ $\quad 80.3\text{ mol } CH_4 \times \frac{6.02\times10^{23}}{1\text{ mol}} \times \frac{5\text{ atoms}}{1\text{ mole}} = 2.4\times10^{26}\text{ molecules}$

(8) $8.273\text{ mol } CaCO_3 \times \frac{100.0\text{ g}}{1\text{ mol}} = 827.3\text{ g}$ $\quad 8.273\text{ mol } CaCO_3 \times \frac{6.02\times10^{23}\text{ molecules}}{1\text{ mol}} \times \frac{5\text{ atoms}}{1\text{ molecule}} = 2.5\times10^{25}\text{ atoms}$

QUATUM MECHANICS

(1) Electrons releasing energy and dropping to lower energy level from the excited state.

(2) READ ABOUT EMISSION SPECTRUM

(3) (A) $\nu = ?$

$\lambda = 450\text{ nm} \times \frac{10^{-9}\text{ m}}{1\text{ nm}} = 4.50\times10^{-7}\text{ m}$ $\quad \nu = \frac{c}{\lambda} = \frac{3.00\times10^{8}\text{ m/s}}{4.50\times10^{-7}\text{ hz}} = 6.67\times10^{14}\text{ hz.}$

(B) $E = h\nu = (6.626\times10^{-34}\text{ J}\cdot\text{s})(6.67\times10^{14}\text{ hz}) = 4.42\times10^{-19}\text{ J}$

(5) READ chapter 4 section 2-3

(6) Vanadium: $[Ar]\,4s^2 3d^3$ $\quad$ Tellurium: $[Kr]\,5s^2 4d^{10} 5p^4$ $\quad$ Phosphorus: $[Ne]\,3s^2 3p^3$

Bonding

(1) Look up

(2) Look up (don't worry about metallic)

(3) (A) 1 (B) 8 (C) 4 (d) 5

(4) Na· :Ar: ·C· ·N·

(5) Look up

(6) Cs = lose one Cs^+ Cation

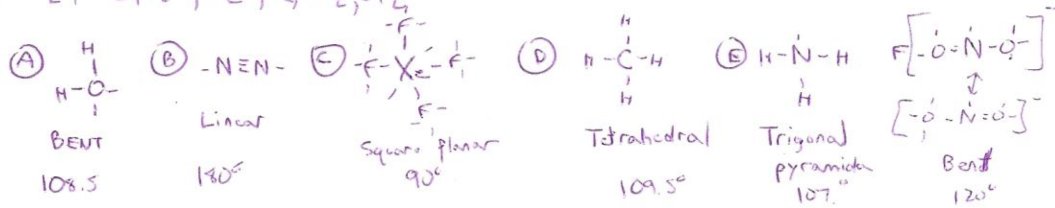
Br = gain one Br^- anion

P = gain three P^{-3} anion

(7) Look up

(8) (A) metallic (B) Ionic (C) Molecular (D) Molecular (E) Ionic

(9) H_2, N_2, O_2, F_2, I_2, Cl_2, Br_2

(10) 

(11) Look up

(12) Look up .... No Bond length

(13) (A) Ammonia NH_3 pyramidal polar (B) bent polar (C) linear Nonpolar (d) CI_4 ~~tetrahedral~~ Tetrahedral Nonpolar

(14) H-bonding, dipole-dipole, london dispersion .... look up in notes

(15) Look up

(16) (A) H_2, N_2, I_2 electrons shared evenly (B) H-F, H-O, I-Cl one is more electronegative (C) NaCl Metal nonmetal no sharing of electrons

(17) (a) AT 40°C the particles have more energy, thus easier to break the H-bond.

(B) C_3H_8 is non polar, has little intermolecular forces (london dispersion)

(C) Oil is nonpolar, water is polar they donot blend.

Chapter 9

① Look up

② $2Ag + Cl_2 \rightarrow 2AgCl$

x 84g

$84.0g\ AgCl \times \frac{1mol\ AgCl}{143.32} \times \frac{1mol\ Cl_2}{2mol\ AgCl} \times \frac{70.90}{1mol\ Cl_2} = 20.5g\ Cl_2$

③ $\cancel{2}^{4}NH_3 + \cancel{7}^{7}O_2 \rightarrow \cancel{3}^{6}H_2O + \cancel{2}^{4}NO_2$

2.1×10^{24} molecules

$2.1 \times 10^{24} molecules \times \frac{1mol\ molecules}{6.02 \times 10^{23} molecules} \times \frac{4mol\ NH_3}{7mol\ O_2} \times \frac{17.04g\ NH_3}{1mol\ NH_3}$ $\boxed{3.40g\ NH_3}$

④ $2HCl \rightarrow H_2 + Cl_2$

25.8g Actual 13.6g

$25.8g \times \frac{1mol\ HCl}{36.45g} \times \frac{1mol\ Cl_2}{2mol\ HCl} \times \frac{70.90g\ Cl_2}{1mol\ Cl_2} = \boxed{25.1g\ Cl_2}$

$\%\ \text{Yield} = \frac{A}{T} \times 100 = \frac{13.6}{25.1} \times 100 = \boxed{54.2\%}$

⑤ $2H_2 + O_2 \rightarrow 2H_2O$

16.2g 16.4g

$16.2g\ H_2 \times \frac{1mol\ H_2}{2.02g\ H_2} \times \frac{2mol\ H_2O}{2mol\ H_2} \times \frac{18.02g\ H_2O}{1mol\ H_2O} = 144.51g\ H_2O$

$\boxed{16.4g\ O_2} \times \frac{1mol\ O_2}{32.0g\ O_2} \times \frac{2mol\ H_2O}{1mol\ O_2} \times \frac{18.02g\ H_2O}{1mol\ H_2} = \boxed{18.47g\ H_2O}$

Limiting

Maximum amount of H_2O

Nuclear Chem

(1) FISSION → The splitting of an unstable nucleus by bombarding it with SUBATOMIC particles. This ~~[illegible]~~ releases a tremendous amount of energy

Fusion → ~~joing~~ joining two smaller atoms by collidingthem with very high energy, this also releases tremendous energy.

Nuclear Decay - This is a spontaneous release of a particle from the nucleus of a radioactive ~~istope~~ isotope. This is so it can achieve a stable ratio of 1:1 of 1:1.5 for the protons to neutrons.

(2) α - ALPHA DECAY $^{4}_{2}He$ $\quad ^{235}_{92}U \rightarrow ^{4}_{2}He + ^{231}_{90}Th$ $\qquad$ Penetration

β . beta Decay $\quad ^{14}_{6}C \rightarrow ^{14}_{7}N + ^{-1}_{0}\beta$ $\qquad \gamma > \beta > \alpha$

(electron from the nucleus)

γ → pure energy (HIGH ENERGY!)

(3) (A) $200g \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = 6.25g$

(1) (2) (3) (4) (5)

$\frac{13}{2.6} = 5\ \frac{1}{2}$ lives

(B) $\frac{100}{2} = \frac{50}{2} = 25$ $\quad$ 2, $\frac{1}{2}$ lives! in 16 days

each 1/2 life is 8days

(4) (A) $^{230}_{90}Th \rightarrow ^{226}_{88}Ra + ^{4}_{2}He$

(B) $^{235}_{92}U \rightarrow ^{231}_{90}Th + ^{4}_{2}He$

(C) $^{234}_{90}Th \rightarrow ^{234}_{91}Pa + \beta$

(D) $^{66}_{29}Cu \rightarrow ^{66}_{30}Zn + \beta$