Working with avogadro + moles.

1) a) 35.5 g Chlorine atoms = 6.02×10^{23} atoms

b) 27 g Aluminium. = 6.02×10^{23} atoms.

c) 3.1 g Phosphorus $\frac{3.1}{31} = 0.1 \times 6.02 \times 10^{23} = 6.02 \times 10^{22}$

d) 336 g Iron $\frac{336}{55.8} \times 6.02 \times 10^{23} = 3.6 \times 10^{24}$

e) 48 g Mg $\frac{48}{24.3} \times 6.02 \times 10^{23} = 1.2 \times 10^{24}$.

f) 1.6 g O $\frac{1.6}{16} \times 6.02 \times 10^{23} = 6.02 \times 10^{22}$

g) 0.4 g O $\frac{0.4}{16} \times 6.02 \times 10^{23} = 1.51 \times 10^{22}$.

h) 216 g Ag $\frac{216}{107.9} \times 6.02 \times 10^{23} = 1.21 \times 10^{24}$

2). How many grams g Zinc contain.

a) $6.02 \times 10^{23} = 65.4$ g

$1 = \frac{65.4}{6.02 \times 10^{23}}$

$1 \times 10^{10} = \frac{65.4}{6.02 \times 10^{23}} \times (1 \times 10^{10})$

$= 1.08 \times 10^{-12}$ g

b) $6 \times 10^{20} = \frac{65.4}{6.02 \times 10^{23}} \times 6 \times 10^{20}$.

$= 0.065$ g

3). 1 mole = 6.02×10^{23} = 27 g.

a) 1 atom = $\frac{27}{6.02 \times 10^{23}}$

$2 \times 10^{23} = \frac{27}{6.02 \times 10^{23}} \times 2 \times 10^{23}$

$= 8.97\ g$

b)

$6 \times 10^{20} = \frac{27}{6.02 \times 10^{23}} \times 6 \times 10^{20}$.

$= 0.027\ g$

4). 1 mole = 6.02×10^{23} = 12g

a) 1 atom = $\frac{12}{6.02 \times 10^{23}}$

$6 \times 10^{10} = \frac{12}{6.02 \times 10^{23}} \times (6 \times 10^{10})$

$= 1.196 \times 10^{-12}$ g $1.2\ g \times 10^{-12}$.

b)

$2 \times 10^{21} = \frac{12}{6.02 \times 10^{23}} \times 2 \times 10^{21}$.

$= 0.04\ g$

5) a). 12g Mg $\frac{12}{24} = 0.5$ mole $\therefore 0.5 \times 6.02 \times 10^{23}$

$= 3.01 \times 10^{23}$

$\therefore$ 1/2 mole of Ca $= \frac{40}{2} = 20g$

6) 3g Al $\frac{3}{27} = 0.11$

$\frac{3}{27} \times 108 = 12g$

c). 1g He $\frac{1}{4} \times 65 = 16.25g$

d) 39g K $\frac{39}{39} = 1$ mole.

Na = 23g.

6). $3.11 \times 10^{22} = 3.62g$

$1 = \frac{3.62}{3.11 \times 10^{22}}$

$6.02 \times 10^{23} = \frac{3.62}{3.11 \times 10^{22}} \times 6.02 \times 10^{23}$

$= 70.1g$ $\therefore$ Ga

7) $4.013 \times 10^{22} = 5g$

$1 = \frac{5}{4.013 \times 10^{22}}$

$6.02 \times 10^{23} = \frac{5}{4.013 \times 10^{22}} \times 6.02 \times 10^{23}$

$= 75$ $\therefore$ As

8) $1.735 \times 10^{22} = 2.45\,g$

$1 = \frac{2.45}{1.735 \times 10^{22}}$

$6.02 \times 10^{23} = \frac{2.45}{1.735 \times 10^{22}} \times 6.02 \times 10^{23}$

$= 85$ $\therefore$ Rb^+

9). $4.61 \times 10^{22} = 5.44\,g$

$1 \text{ molecule} = \frac{5.44}{4.61 \times 10^{22}}$

$6.02 \times 10^{23} = \frac{5.44}{4.61 \times 10^{22}} \times 6.02 \times 10^{23}$

$= 71.04$

All G7 are diatomic $\therefore$ atomic weight = 35.5

$\therefore$ Cl

10). 6.02×10^{23} atoms $Ti = 47.88\,g$

$\frac{6.02 \times 10^{23}}{47.88} \times 0.001 = 0.001\,g$

1.2573×10^{19} atoms $= 1\,mg$.

1×10^9 atoms $= 1$ p

1 atom $= \frac{1}{1 \times 10^9}$ $\therefore$ $1\,mg = \frac{1.2573 \times 10^{19}}{1 \times 10^9}$

$= 1.25 \times 10^{10}$ p.

11). $9.2g$ $C_2H_6O = 46g$

$\therefore 9.2g = \frac{9.2}{46} = 0.2$ mole.

a) $0.2 \times 6.02 \times 10^{23} = 1.204 \times 10^{23}$

b) $0.2 \times 6.02 \times 10^{23} \times 2 = 2.408 \times 10^{23}$

c) $0.2 \times 6.02 \times 10^{23} \times 6 = 7.224 \times 10^{23}$.

d) $0.2 \times 6.02 \times 10^{23} = 1.204 \times 10^{23}$

12). $5g = \frac{5}{30} = 0.166$ moles. $NO = 30$.

1 mole $= 6.02 \times 10^{23}$

0.116 moles $= 6.02 \times 10^{23} \times 0.116$

$= 1 \times 10^{23}$ molecules per mile.

13). 1 dm^3 water Mass = 1 000 g

1 mole = 18g

$\frac{1}{18} = 1g$

$\frac{1000}{18}$ moles $= 1,000$

$\therefore 6.02 \times 10^{23} \times \frac{1000}{18}$

$= 3.34 \times 10^{25}$ molecules.

14). RMM $= 12(12) + 22 + 11(16) = 342$ g/mol.

$1000g = \frac{1000}{342} = 2.924$ moles.

1 mole $= 6.02 \times 10^{23}$

$2.924 = 6.02 \times 10^{23} \times 2.924 = 1.76 \times 10^{24}$.