Name _____ Date _____

Worksheet 4.1: Calculations involving the amounts of substances

All the questions on this worksheet can be done without a calculator.
Avogadro constant = 6.02×10^{23} mol^{-1}.

Give your answers to three significant figures if they are non-divisible.

1 Convert the following units:

a 75.1 g to kg _____

b 0.433 tonne to g _____

c 19.9 kg to g _____

d 84 cm^3 to dm^3 _____

e 0.604 dm^3 to cm^3 _____

f 2.35×10^{-3} m^3 to cm^3 _____

g 0.41 ml to dm^3 _____

h 1.06 g dm^{-3} of Na_2CO_3 to mol dm^{-3} _____

i 0.05 mol dm^{-3} of $CuCl_2$ to g dm^{-3} _____

j 0.7 mol dm^{-3} HCl to kg m^{-3} _____

2 Calculate the number of particles in the following questions; give your answers in standard forms:

a the number of molecules in 3 mol of carbon dioxide

_____

_____

b the number of sulfate(VI) ions in 0.002 mol of sodium sulfate(VI)

_____

_____

c the number of oxygen atoms in 0.75 mol of H_2O_2 molecule

_____

_____

d the number of hydrogen atoms in 12 mol of ethyl ethanoate molecules

_____

e the number of P_4 molecules in 12.388 g of phosphorus

f the number of potassium ions in 69.105 g of potassium carbonate

g the number of H atoms in 1443.4 g of pentane

h the number of H^+ ions in 5 cm^3 of 0.1 mol dm^{-3} HNO_3

i the number of OH^- ions in 200 cm^3 of 0.5 mol dm^{-3} $Ba(OH)_2$

j the number of Fe^{2+} ions when 11.17 g of Fe reacts with excess H_2SO_4

3 Calculate the mass of the following substances:

a 10 mol of propane

b 1×10^{-3} mol of calcium carbonate

c 0.0005 mol of potassium manganate(VII)

d 1 molecule of ethanol in g

e 60 molecules of N_2H_4 in g

4 Calculate the mass of the solute required to make each of the following solutions:

a 50 cm^3 of 0.1 mol dm^{-3} LiCl

b 2 dm^3 of 1.5 mol dm^{-3} $(COOH)_2$

c 100 cm^3 of 40 g dm^{-3} NaOH

d 1000 ml of 0.05 mol dm^{-3} magnesium sulfate(IV)

e 25 cm^3 of 0.0002 mol dm^{-3} $MnCl_2$