## CH1011 Tutorial 1 Answers

1. Write down the atomic symbol for carbon-13 include the atomic number and mass number and label these clearly. How many neutrons does this element have.

## $C_{6}^{13}$ this element has 7 neutrons

2. What is the first alkaline earth metal in the periodic table how many protons does it have?

Be - beryllium	4 protons
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## 3. Balance the following equation:

	K(s)	+	H <sub>2</sub> O(l)	$\rightarrow$	H <sub>2</sub> (g)	+	KOH(aq)	
	2K(s)	+	2H <sub>2</sub> O(l)	$\rightarrow$	H <sub>2</sub> (g)	+	2KOH(aq)	
Atoms: Totals :	2K 2K 4H	20	4H 2O		2H 2K 4H	20	2K 2O 2H	Balanced.

4. Name the following compounds:

SCl<sub>6</sub> sulphur hexachloride – covalent compound

PbO<sub>2</sub> lead(IV) oxide – ionic, transition metal type II variable oxidation state

 $H_2CO_3$  carbonic acid – acid, base = carbonate

BeCl<sub>2</sub> beryllium chloride – ionic, type I fixed oxidation state (here II)

5. Tetraethyllead  $(C_2H_5)_4Pb$  was used extensively as a antiknock additive in gasoline until quite recently (when the lead concentrations in urban areas became too high to be accepatable). The formation of tetraethyllead from chloroethane, sodium and lead is described by the following balanced equation:

 $4C_2H_5Cl(g) + 4Na(s) + Pb(s) \rightarrow (C_2H_5)_4Pb(l) + 4NaCl(s)$ 

How much tetraethyllead would be formed (in kg) from 270.2 kg of chloroethane, 95.3 kg of sodium and 207.2 kg of lead assuming complete reaction.

 $C_2H_5Cl: M = 2*12.0 + 5*1.0 + 1*35.5 \text{ g/mol}$ 64.5 g/mol =  $= 270.2 \times 10^3 / 64.5$ n C<sub>2</sub>H<sub>5</sub>Cl => 4000 mol Na: M = 23.0 g/mol $= 95.3 \times 10^3 / 23$ nNa = > 4000 mol $M\ =\ 207.2\ g/mol$ Pb:  $= 207.2 \times 10^3 / 207.2$ nPb = 1000 molThis is the **limiting reagent**  $(C_2H_5)_4Pb M = (29.0)*4 + 207.2$ = 323.2 g/mol  $n(C_2H_5)_4Pb * M(C_2H_5)_4Pb$  $g(C_2H_5)_4Pb$ = 1000 mol \* 323.2 mol.g<sup>-1</sup> = 323.2 kg = 323 kg (this is to 3 significant figures) =