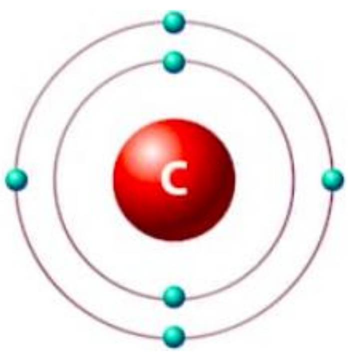
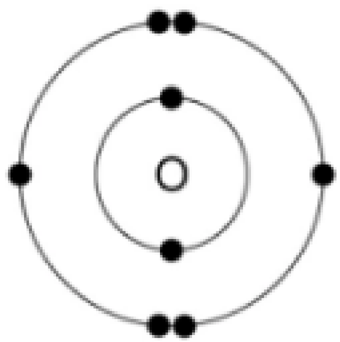
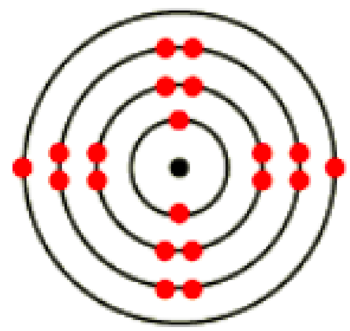
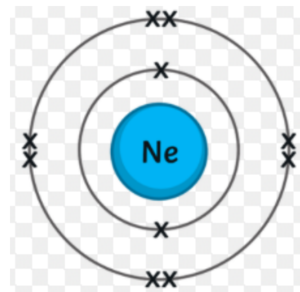
GCSE to A Level ‘Bridging the Gap’

ANSWERS

Task 1:





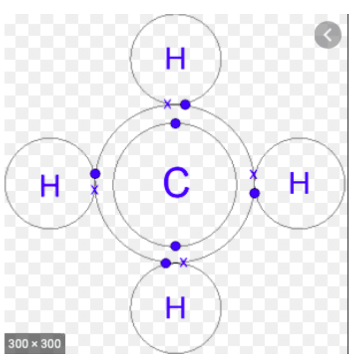



Task 2: Use a Periodic Table to complete the table below:

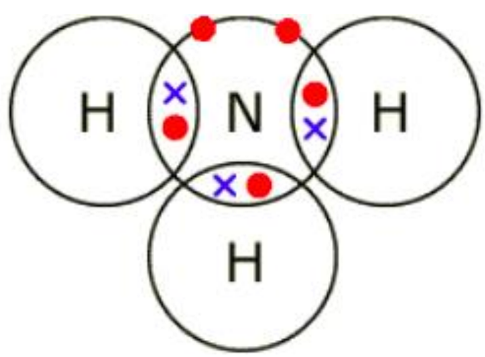
Atom or Ion	Atomic Number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electron Structure
$^{16}O^{2-}$	8	16	8	8	10	$[2,8]^{2-}$
^{31}P	15	31	15	16	15	2,8,5
^{27}Al	13	27	13	14	13	2,8,3
$^{27}Al^{3+}$	13	27	13	14	10	$[2,8]^{3+}$
$^{32}S^{2-}$	16	32	16	16	18	$[2,8,8]^{2-}$
$^{24}Mg^{2+}$	12	24	12	12	10	$[2,8]^{2+}$

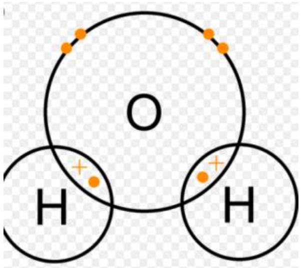
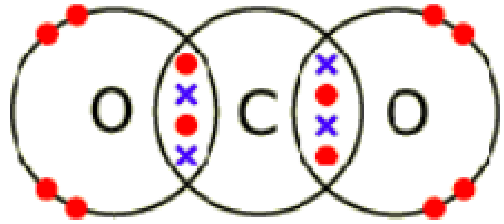
Task 3

CH_4



NH_3



H_2O  	CO_2 

Task 4

A = Simple Molecular, B = Giant Ionic, C = Metallic, D = Giant Covalent, E = Simple Molecular

Task 5 ***Doesn't exist….***

Task 6: Write the formula below for these substances (you will need to use the table above and a Periodic Table)

1. Silver Bromide AgBr
2. Sodium Carbonate Na_2CO_3
3. Potassium Oxide K_2O
4. Iron (III) Oxide Fe_2O_3
5. Chromium (III) Chloride $CrCl_3$
6. Calcium Hydroxide $Ca(OH)_2$
7. Lead (I) Oxide Pb_2O
8. Rubidium Carbonate Rb_2CO_3
9. Zinc Hydrogencarbonate $Zn(HCO_3)_2$
10. Ammonium Sulfate $(NH_4)_2SO_4$
11. Gallium Hydroxide $Ga(OH)_3$
12. Strontium Selenide SrSe

Task 7: Complete and Balance the following symbol equations where necessary

1. $Ca + H_2SO_4 \rightarrow CaSO_4 + H_2$
2. $2CO + O_2 \rightarrow 2CO_2$
3. $Li_2CO_3 + 2HCl \rightarrow 2LiCl + H_2O + CO_2$
4. $Fe_2O_3 + 6HCl \rightarrow 2FeCl_3 + 3H_2O$
5. $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$
6. $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

Topic 4: Calculations

Task 8: Calculate the relative molecule mass (Mr) of:

a. H_2 = 2
b. Ne = 20
c. NH_3 = 17
d. $Ca(OH)_2$ = 74
e. K_2SO_4 = 174
f. NH_4NO_3 = 80

Task 9: Attempt these questions – you will need to use the equations above and the ratio of moles in the chemical equations given.

1. What mass of Oxygen is needed to react with 8.5g of hydrogen sulphide?

   $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$

   Mr of H2S = 34

   Moles of H2S = 8.5/34 = 0.25 moles

   Moles of Oxygen = 0.25 x 3/2 = 0.375 moles

   Mass of Oxygen = 0.375 x 32 = 12g

2. What mass of potassium oxide is formed when 7.8g of potassium is burned in oxygen?

   $4K + O_2 \rightarrow 2K_2O$

   Moles of Potassium = 7.8 / 39 = 0.2

   Moles of K_2O = 0.2 / 2 = 0.1

   Mr of K2O = (39x2) + 16 = 94

   Mass of K2O = 0.1 x 94 = 9.4g

3. Railway lines are welded together by the Thermite reaction which produces molten iron. What mass of iron is formed from 1kg of iron oxide?

   $Fe_2O_3 + 2Al \rightarrow 2Fe + Al_2O_3$

   Mr of Fe2O3 = 160

   Moles of Fe2O3 = 1000/160 = 6.25 moles

   Moles of Fe = 6.25 x 2 = 12.5 moles

   Mass of Fe = 12.5 x 56 = 700g

4. What mass of oxygen is required to oxidise 10g of ammonia to NO?

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

Mr of NH3 = 17

Moles of NH3 = 10/17 = 0.588 moles

Moles of O2 = 0.588 x 5/4 = 0.735 moles

Mass of O2 = 0.735 x 32 = 23.5g

5. What mass of aluminium oxide is produced when 135g of aluminium is burned in oxygen?

$2Al + 3O_2 \rightarrow Al_2O_3$

Moles of Al = 135 / 27 = 5 moles

Moles of Al2O3 = 5 x 0.5 = 2.5

Mr of Al2O3 = (27x2) + (16x3) = 102

Mass of Al2O3 = 2.5 x 102 = 255g

Task 10 Answers:

1) In each case work out the limiting reagent and moles of ammonia form

$N_2 + 3H_2 \rightarrow 2NH_3$

a) 3 moles of N_2 + 3 moles of H_2	1	3	2
b) 3 moles of N_2 + 10 moles of H_2	3	9	6
c) 0.1 moles of N_2 + 0.2 moles of H_2	0.67	0.2	1.33
d) 0.5 moles of N_2 + 2.0 moles of H_2	0.5	1.5	1.0
e) 2 moles of N_2 + 10 moles of H_2	2	6	4

2) In each case work out the limiting reagent and moles of ammonia form

$2SO_2 + O_2 \rightarrow 2SO_3$

a) 3 moles of SO_2 + 3 moles of O_2	3	1.5	3
b) 3 moles of SO_2 + 2 moles of O_2	3	1.5	3
c) 0.1 moles of SO_2 + 0.02 moles of O_2	0.04	0.02	0.04
d) 2.0 moles of SO_2 + 0.4 moles of O_2	0.8	0.4	0.8
e) 2 moles of SO_2 + 10 moles of O_2	2	1	2

3. Moles Fe = $\frac{5.00}{55.8}$ = 0.08961

Moles S = $\frac{5.00}{32.1}$ = 0.1558

Moles FeS = 0.08961

Mass FeS = 87.9 x 0.08961 = 7.88

4. Moles H_2SO_4 = $\frac{2000}{98.1}$ = 20.39

Moles NH_3 = $\frac{1000}{17.0}$ = 58.82

Moles $(NH_4)_2SO_4$ = 20.39

Mass $(NH_4)_2SO_4$ = 132.1 x 20.39 = 2690 g