The Periodic Table

Past Year Topical Questions

Oct/Nov 2002

2 Manganese is a transition element. It has more than one valency and the metal and its compounds are catalysts.

(a) (i) Predict **three** other properties of manganese that are typical of transition elements.

.....

.....[3]

(ii) Complete the electron distribution of manganese by inserting one number.

2 + 8 + ... + 2 [1]

3 The elements in Period 3 and some of their common oxidation states are shown below.

Element	Na	Mg	Al	Si	P	S	Cl	Ar
Oxidation State	+1	+2	+3	+4	–3	–2	–1	0

(a) (i) Why do the oxidation states increase from sodium to silicon?

.....[1]

(ii) After Group(IV) the oxidation states are negative and decrease across the period. Explain why.

.....

.....[2]

(b) The following compounds contain two elements. Predict their formulae.

aluminium sulphide .....

silicon phosphide ..... [2]

(c) Choose a different element from Period 3 that matches each description.

(i) It has a similar structure to diamond.

.....[1]

(ii) It reacts violently with cold water to form a solution pH = 14.

.....[1]

(iii) It has a gaseous oxide of the type XO_2, which is acidic.

.....[1]

(d) The only oxidation state of argon is zero. Why it is used to fill light bulbs?

.....

.....[1]

May/June 2003

5 The first three elements in Period 6 of the Periodic Table of the Elements are caesium, barium and lanthanum.

(a) How many **more** protons, electrons and neutrons are there in one atom of lanthanum than in one atom of caesium. Use your copy of the Periodic Table of the Elements to help you.

number of protons .....

number of electrons .....

number of neutrons ..... [3]

May/June 2005

1 Three of the halogens in Group VII are:

chlorine
bromine
iodine

(a) (i) How does their colour change down the Group?

.....[1]

(ii) How does their physical state (solid, liquid or gas) change down the Group?

.....[1]

(iii) Predict the colour and physical state of fluorine.

colour .....

physical state .....[2]

(b) Describe how you could distinguish between aqueous potassium bromide and aqueous potassium iodide.

test .....

result with bromide .....

result with iodide .....[3]

May/June 2006

1 Iron is a transition element.

(a) Which of the following statements about transition elements are correct?

Tick **three** boxes.

The metals are highly coloured e.g. yellow, green, blue. ☐

The metals have low melting points. ☐

Their compounds are highly coloured. ☐

Their compounds are colourless. ☐

The elements and their compounds are often used as catalysts. ☐

They have more than one oxidation state. ☐

[3]

(b) (i) In which Period in the Periodic Table is iron to be found?

..... [1]

(ii) Use the Periodic Table to work out the number of protons and the number of neutrons in one atom of iron.

number of protons = ... number of neutrons = ... [1]

May/June 2007

(e) Fluorine and astatine are halogens. Use your knowledge of the other halogens to predict the following:

(i) The physical state of fluorine at r.t.p. .....

The physical state of astatine at r.t.p. ..... [2]

(ii) **Two** similarities in their chemical properties

.....

..... [2]

May/June 2008

1 For each of the following select an element from Period 4, potassium to krypton, that matches the description.

(a) It is a brown liquid at room temperature. .....

(b) It forms a compound with hydrogen having the formula XH_4. .....

(c) A metal that reacts violently with cold water. .....

(d) It has a complete outer energy level. .....

(e) It has oxidation states of 2 and 3 only. .....

(f) It can form an ion of the type X^-. .....

(g) One of its oxides is the catalyst in the Contact Process. .....

[Total: 7]

May/June 2009

3 The following is a list of the electron distributions of atoms of unknown elements.

element	electron distribution
A	2,5
B	2,8,4
C	2,8,8,2
D	2,8,18,8
E	2,8,18,8,1
F	2,8,18,18,7

(a) Choose an element from the list for each of the following descriptions.

(i) It is a noble gas. .....

(ii) It is a soft metal with a low density. .....

(iii) It can form a covalent compound with element **A**. .....

(iv) It has a giant covalent structure similar to diamond. .....

(v) It can form a negative ion of the type X^{3-}. ..... [5]