1 Describe how the elements in the Periodic Table arranged

2 State the names of the following elements

- The element in Period 3 and Group 14
- The element in Period 5 and Group 8
- The element in Period 1 and Group 18

3 State whether each of the following elements is in the s, p, d or f block

Mg	Mn	Sm	As	Ne	U	Ti	Cs

4 State the significance of the period number (n)

5 For each of the following atoms state the number of the principal energy level and the number of valence electrons

Atom	principal energy level	number of valence electrons
Ca		
P		
Br		
Si		
Rb		

6 State the condensed electron configuration of each of the following

Atom	condensed electron configuration
Be	
S	
Ti	
Cu	
As	

7 Classify each of the following elements by putting ticks in boxes

	alkali metal	halogen	noble gas	transition metal	lanthanoid	actinoid
Br						
Gd						
Xe						
Mo						
Cm						
Os						
K						

8 Classify each of the following elements based on their position in the Periodic Table by putting ticks in boxes

	metal	non-metal	metalloid
Nb			
Se			
Ge			
Pt			
Ho			
Si			

9 State and explain the trends in atomic radius down a group

10 State and explain the trends in atomic radius across a period.

11 Explain why Ca^+ is smaller than Ca

12 Explain why Cl^- is larger than Cl

13 State and explain which is the larger species in each of the following pairs:

Ar and Cl^- Ca^{2+} and S^{2-} Ar and K Ar and K^+ Cl^- and Br^- Na^+ and Cl^-

14 Write an equation for the first ionisation energy of calcium

15 State and explain the trend in first ionisation energy down a group

16 State and explain the *general* trend in first ionisation energy across a period.

17 Explain why Mg has a higher first ionisation energy than Al

18 Explain why S has a lower first ionisation energy than P

19 Write an equation for the first electron affinity of sulfur

20 State and explain the trend in first electron affinity down a group

21 State and explain the general trend in first electron affinity across a period

22 State and explain the trend in electronegativity down a group

23 State and explain the trend in electronegativity across a period

24 Explain why metallic character decreases across a period

25 Explain the trend in metallic character down a group using Group 14 as an example

26 Classify each of the oxides below as acidic or basic or amphoteric.

Na_2O MgO Al_2O_3 SiO_2 P_4O_6 P_4O_{10} SO_2 SO_3 Cl_2O Cl_2O_7

27 Write equations for the reactions of the following with water:

Na_2O MgO P_4O_{10} NO_2 SO_2 SO_3

28 State whether each of the solutions formed in 27 are acidic, alkaline or neutral.

29 Explain two reasons why the elements Li and Na are placed in the same group in the Periodic Table

30 Explain the decrease in melting point of the alkali metals from Li to Cs.

31 Write an equation for the reactions of sodium with water.

32 State two observations for the reaction between sodium and water

33 Explain why potassium is more reactive than sodium

34 Write an equation for the reaction between sodium and chlorine.

35 Explain why elements in the same group have similar chemical properties

36 Explain the increase in melting point and boiling point down the halogen group

37 State and explain the colour changes that are observed when the following are mixed:

- chlorine solution and potassium bromide solution
- bromine solution and potassium iodide solution
- bromine solution and potassium chloride solution

38 Write an ionic equation for the reaction that occurs when chlorine solution is added to potassium bromide solution

39 Predict which of the following reactions will be most vigorous:

$Na + Cl_2$ $K + F_2$ $Li + I_2$

40 State the characteristic properties of transition elements

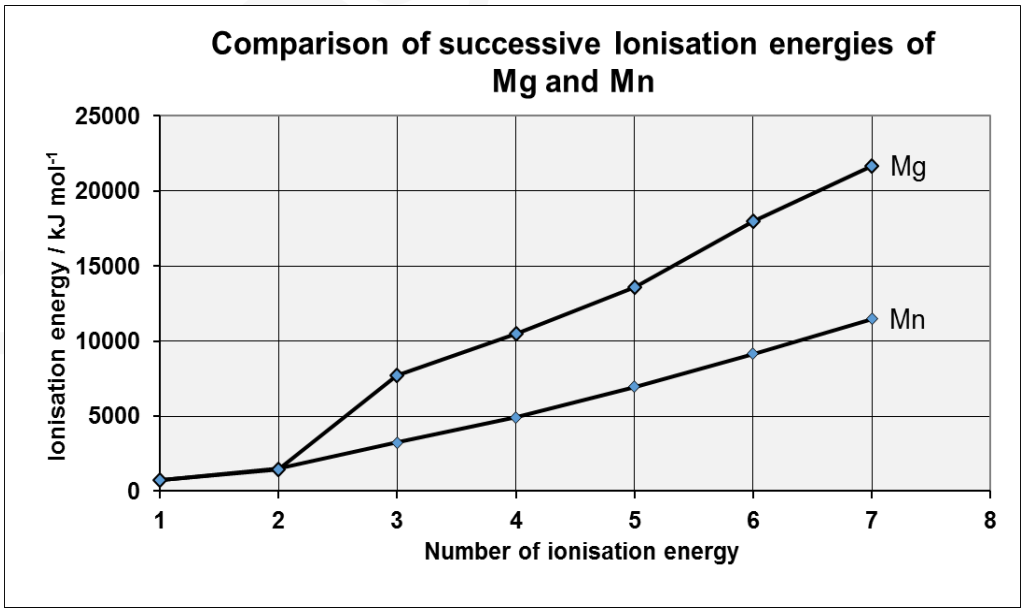
41 Write the electron configurations for the following:

Ti Fe Fe^{2+} Fe^{3+} Ni^{2+} Cr Cr^{3+} Cu Cu^{+} Zn^{2+}

42 Explain why Zn is not considered as a transition element

43 Explain why all transition metals exhibit the +2 oxidation state

44 Use the graph below to explain why magnesium only exhibits oxidation state +2 but manganese exhibits a range of oxidation states.



45 Deduce whether each of the following ions is diamagnetic or paramagnetic

Fe^{2+} Fe^{3+} Ni^{2+} Cr^{3+} Cu^{+} Zn^{2+}

46 Explain what a *ligand* is and state whether it is a Lewis acid or Lewis base.

47 Explain how a ligand bonds to a transition metal ion

48 Draw diagrams of the complex ion $[Fe(H_2O)_6]^{2+}$

49 Deduce the total charge on each of the following ions:

$[Fe(CN)_6]^{?}$ contains iron(III)
$[CuCl_4]^{?}$ contains copper(II)
$[Ag(NH_3)_2]^{?}$ contains silver(I)
$[Ti(OH)(H_2O)_5]^{?}$ contains titanium(III)

50 Deduce the oxidation state of the transition metal in each of the following:

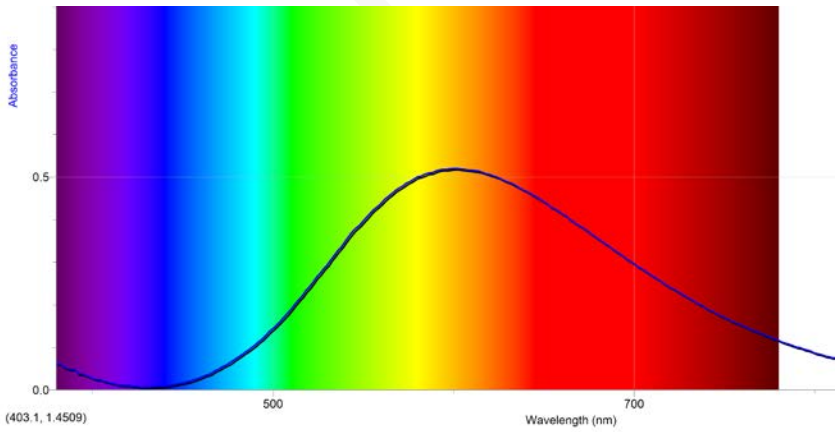
$[TiCl_2(NH_3)_4]Cl$ $[Co(NH_3)_5Cl]Cl_2$ K_3NiF_6 $K_2[Ni(CO)_2(CN)_2]$

51 Explain why some transition metal ions are coloured.

52 Explain why complexes of Ti^{4+} and Zn^{2+} are colourless.

53 In each case below explain what colour the transition metal complex ion is:

- It absorbs orange light
- It absorbs green light
- It absorbs light in the range 424 nm to 491 nm
- The complex ion with the spectrum shown



54 Explain why $[Fe(H_2O)_6]^{2+}$ and $[Co(H_2O)_6]^{3+}$ are different colours

55 Explain why $[Co(H_2O)_6]^{2+}$ and $[Co(H_2O)_6]^{3+}$ are different colours

56 Explain why $[Co(H_2O)_6]^{2+}$ and $[Ni(H_2O)_6]^{2+}$ are different colours

57 Explain why $[Co(H_2O)_6]^{2+}$ and $[Co(NH_3)_6]^{2+}$ are different colours

58 Explain whether $[Cu(H_2O)_6]^{2+}$ or $[Cu(NH_3)_4(H_2O)_2]^{2+}$ absorbs light of a longer wavelength