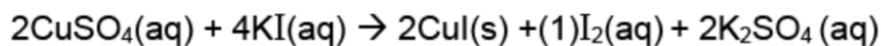


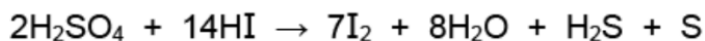
1.



Describe the type of reaction shown by this equation. Explain your answer in terms of electron transfer.

- Redox
- Copper ions gained electrons AND iodide ions lost electrons

2.



Explain why this reaction is redox in terms of oxidation number.

- Oxidation number of I increases from -1 to 0 = oxidation/ reducing agent
- Oxidation number of S decreases from +6 to 0 OR -2 = reduction/ oxidising agent

3.

- (i) Complete Table 2.1 to show the maximum oxidation number of the elements Na to P in their chlorides.

**Table 2.1**

element	Na	Mg	Al	Si	P
maximum oxidation number					

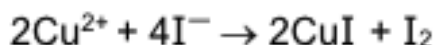
element	Na	Mg	Al	Si	P
maximum oxidation number of elements in chlorides	(+1)	(+2)	(+3)	(+4)	(+5)

- (ii) State what determines maximum oxidation number of elements in Period 3.  
The number of outer/ valence electrons

4. When KI(aq) is added to CuSO<sub>4</sub>(aq) the blue-coloured solution turns brown and a white precipitate of CuI(s) is seen.



a. Complete the equation for the reaction

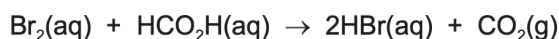


b. Identify oxidising agent in this reaction. Explain in terms of electron transfer  
 $\text{Cu}^{2+}$  OR  $\text{CuSO}_4$  AND  
 copper (species / ion) has gained / taken electron(s) from iodide (ion)

5. Define reducing agent  
 Species that donates electrons

6.

Aqueous bromine reacts with methanoic acid to form hydrogen bromide and carbon dioxide gas.



The table shows the oxidation numbers of bromine and carbon in the species involved in this reaction.

	Br in $\text{Br}_2$	C in $\text{HCO}_2\text{H}$	Br in $\text{HBr}$	C in $\text{CO}_2$
oxidation number	0	+2	-1	+4

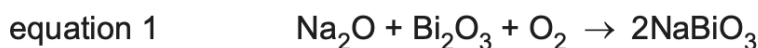
Identify the oxidising agent in this reaction. Explain your reasoning with reference to oxidation numbers.

Br / bromine as the oxidation number of Br decreases / goes from 0  $\rightarrow$  -1 OR  
 Bromine as it causes oxidation number of C (in methanoic acid) to increase / go  
 from (+)2  $\rightarrow$  (+)4

7. State what determines the maximum oxidation number of elements in Period 3.  
 - number of outer/valence electrons
8. State why the maximum oxidation number of aluminium is different from that of phosphorus.  
 - different number of valence/outer shell electrons

9.

$\text{Bi}_2\text{O}_3$  can be used to form  $\text{NaBiO}_3$ , as shown in equation 1.



Identify the reducing agent in equation 1.

- $\text{Bi}_2\text{O}_3$

10. Explain the term oxidising agent.  
 - a substance that oxidises another by removing electrons from it / causing electron loss // reduced by gaining electrons
11. Define reducing agent.  
 - species that donates electrons

12. State the type of redox reaction in which the same species is both oxidised and reduced simultaneously.

- Disproportionation