

Solutions

2.1 Sodium > calcium > magnesium > copper.

2.2 Copper.

2.3 Aluminium is more reactive than carbon, so carbon cannot reduce its oxide.

3.1 Iron > copper, because iron displaces copper – iron atoms form ions more readily; magnesium > iron, because iron cannot displace magnesium; order: Mg > Fe > Cu; reactivity is the tendency to lose electrons and form positive ions.

3.2 Iron oxide loses oxygen to become iron – iron is reduced; carbon gains oxygen to become carbon dioxide – carbon is oxidised; overall, carbon reduces iron oxide to iron. (Correction to the question's premise is expected: iron is REDUCED, carbon is OXIDISED.)

3.3 $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$; $\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}$; the iron(II) ion gains electrons, so Fe^{2+} is reduced; magnesium is oxidised.