Generating Redox Tables

1. From the evidence given, **set up a table** of relative strengths of oxidizing and reducing agents. Write all half-reaction equations as reductions and label the strongest oxidizing agent and the strongest reducing agent.

$Co(s) + Pd^{2+}(aq) \xrightarrow{spont} Co^{2+}(aq) + Pd(s)$

$Pd(s) + Pt^{2+}(aq) \xrightarrow{spont} Pd^{2+}(aq) + Pt(s)$

$Mg(s) + Co^{2+}(aq) \xrightarrow{spont} Mg^{2+}(aq) + Co(s)$

$Pt^{2+}_{(aq)} + 2e^- \rightarrow Pt_{(s)}$

$Pd^{2+}_{(aq)} + 2e^- \rightarrow Pd_{(s)}$

$Co^{2+}_{(aq)} + 2e^- \rightarrow Co_{(s)}$

$Mg^{2+}_{(aq)} + 2e^- \rightarrow Mg_{(s)}$

2. The following equations are interpretations of the evidence from the reactions of four metals with various cation solutions. **Make a table** of redox half-reactions and arrange the four metallic ions and the hydrogen ion in order of their decreasing tendency to react.

$Cd(s) + 2\,H^+(aq) \xrightarrow{spont} Cd^{2+}(aq) + H_2(g)$

$Hg(l) + 2\,H^+(aq) \xrightarrow{nonspont} Hg^{2+}(aq) + H_2(g)$

$Be(s) + Cd^{2+}(aq) \xrightarrow{spont} Be^{2+}(aq) + Cd(s)$

$Ca^{2+}(aq) + Be(s) \xrightarrow{nonspont} Ca(s) + Be^{2+}(aq)$

$Hg^{2+} + 2e^- \rightarrow Hg_{(l)}$

$2H^+ + 2e^- \rightarrow H_{2(g)}$

$Cd^{2+} + 2e^- \rightarrow Cd_{(s)}$

$Be^{2+} + 2e^- \rightarrow Be_{(s)}$

$Ca^{2+} + 2e^- \rightarrow Ca_{(s)}$

3. In an experiment, four metals were placed into test tubes containing various ion solutions. Their resulting behaviour is communicated by the equations below. **List the oxidizing agents** from strongest to weakest.

$Pt(s) + 2\,H^+(aq) \xrightarrow{nonspont} Pt^{2+}(aq) + H_2(g)$

$2\,Ce(s) + 3\,Ni^{2+}(aq) \xrightarrow{spont} 2\,Ce^{3+}(aq) + 3\,Ni(s)$

$3\,Sr(s) + 2\,Ce^{3+}(aq) \xrightarrow{spont} 3\,Sr^{2+}(aq) + 2\,Ce(s)$

$Ni(s) + 2\,H^+(aq) \xrightarrow{spont} Ni^{2+}(aq) + H_2(g)$

$Pt^{2+} + 2e^- \rightarrow Pt_{(s)}$

$2H^+ + 2e^- \rightarrow H_{2(g)}$

$Ni^{2+} + 2e^- \rightarrow Ni_{(s)}$

$Ce^{3+} + 3e^- \rightarrow Ce_{(s)}$

$Sr^{2+} + 2e^- \rightarrow Sr_{(s)}$

4. Four metals A, B, C, & D were tested with separate solutions of A^{2+}, B^{2+}, C^{2+} & D^{2+}. Some of the results are summarized in the following table:

	Solution			
Metal	A^{2+}	B^{2+}	C^{2+}	D^{2+}
A		(1) no reaction	(2) reaction	
B				(4) no reaction
D	(3) reaction			

List the ions in order from the strongest to weakest oxidizing agent.

SOA → C^{2+}

A^{2+}

B^{2+}

D^{2+}

5. Four non-metal oxidizing agents X_2, Y_2, Z_2 and W_2 are combined with solutions of ions: X^-, Y^-, Z^- and W^-.

The following results were obtained:

(1) X_2 reacts with W^- and Y^- only.
(2) Y^- will reduce W_2

List the reducing agents from strongest to weakest

SRA → Y^- Z_2

W^-

X^-

Z^-