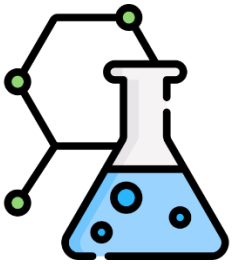

CHEMISTRY TRANSITION WORK

Name: _____

Equations to Learn

You need learn each of the following equations so that you can recall them from memory. This means that when we reach this topic in year 12 you will already have learnt the equation (something that hinders some people through the course). I want to see evidence of these having been practiced and learnt and you will have tests without any notice to make sure you have learnt them.

Physical Chemistry:

1. Redox Equations

$C_2O_4^{2-} \rightarrow 2CO_2 + 2e^-$

$SO_4^{2-} + 4H^+ + 2e^- \rightarrow SO_2 + 2H_2O$

$VO_2^+ + 2H^+ + e^- \rightarrow VO^{2+} + H_2O$

$H_2O_2 + 2e^- \rightarrow 2OH^-$

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^2 + 4H_2O$

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$

Inorganic Chemistry:

2. Group 2 and water (eg Mg)

$Mg_{(s)} + 2H_2O_{(l)} \rightarrow Mg(OH)_{2(aq)} + H_{2(g)}$

3. Group 2 and steam (Mg only)

$Mg_{(s)} + H_2O_{(g)} \rightarrow MgO_{(s)} + H_{2(g)}$

4. Removal of sulfur dioxide

$CaO_{(s)} + 2H_2O_{(l)} + SO_{2(g)} \rightarrow CaSO_{3(s)} + 2H_2O_{(l)}$

$CaCO_{3(s)} + 2H_2O_{(l)} + SO_{2(g)} \rightarrow CaSO_{3(s)} + 2H_2O_{(l)} + CO_{2(g)}$

5. Chlorine in water

$Cl_{2(g)} + H_2O_{(l)} \rightleftharpoons HCl_{(aq)} + HOCl_{(aq)}$

6. Chlorine in water (in sunlight)

$Cl_{2(g)} + H_2O_{(l)} \rightleftharpoons 2HCl_{(aq)} + ½O_{2(g)}$

7. Chlorine in sodium hydroxide

$Cl_{2(g)} + 2\ NaOH \rightarrow NaCl + NaOCl + H_2O$

8. Sodium chloride and sulfuric acid

$NaCl_{(s)} + H_2SO_{4(l)} \rightarrow HCl_{(g)} + NaHSO_{4(s)}$

9. Sodium bromide and sulfuric acid

Acid base: $NaBr_{(s)} + H_2SO_{4(l)} \rightarrow HBr_{(g)} + NaHSO_{4(s)}$

Redox: $2HBr_{(g)} + H_2SO_{4(l)} \rightarrow Br_{2(g)} + SO_{2(g)} + 2H_2O_{(l)}$

Overall: $2NaBr_{(s)} + 3H_2SO_{4(l)} \rightarrow Br_{2(g)} + SO_{2(g)} + 2H_2O_{(l)} + 2NaHSO_{4(s)}$

10. Sodium iodide and sulfuric acid

Acid base: $NaI_{(s)} + H_2SO_{4(l)} \rightarrow HI_{(g)} + NaHSO_{4(s)}$

Redox: $2HI_{(s)} + H_2SO_{4(l)} \rightarrow I_{2(g)} + SO_{2(g)} + 2H_2O_{(l)}$

Further: $6HI_{(s)} + SO_{2(g)} \rightarrow 3I_{2(g)} + H_2S_{(g)} + 2H_2O_{(l)}$

Organic Chemistry:

11. Formation of chlorine free radicals (with UV light)

$Cl_2 \rightarrow 2Cl\cdot$

12. Formation of a halogenoalkane from an alkane

$CH_4 + \cdot Cl \rightarrow \cdot CH_3 + HCl$

$\cdot CH_3 + Cl_2 \rightarrow CH_3Cl + \cdot Cl$

13. Formation of ozone layer

$O_2 \rightarrow 2O\cdot$ (caused by UV light)

$O_2 + O\cdot \rightarrow \cdot O_3$

14. Destruction of ozone layer

$O_{3(g)} + \cdot Cl_{(g)} \rightarrow O_{2(g)} + ClO\cdot_{(g)}$

$O_{3(g)} + ClO\cdot_{(g)} \rightarrow 2O_{2(g)} + \cdot Cl_{(g)}$

overall: $2O_{3(g)} \rightarrow 3O_{2(g)}$

15. Ethanol from ethene

$C_2H_{4(g)} + H_2O_{(g)} \rightarrow C_2H_5OH_{(g)}$

16. Ethanol from glucose

$C_6H_{12}O_{6(g)} \rightarrow 2C_2H_5OH_{(g)} + 2CO_{2(g)}$