c) i) The enthalpy change of a reaction is independent of the path taken in converting reactants into products, provided the initial and final conditions are the same

ii) $-\Delta_c H^\circ = (3\times -394)+(4\times -286)-(-2220) = -106\ kJmol^{-1}$ //.

9a i) The enthalpy change when one mole of a bond in the gaseous state is broken.

ii) Energy is required to break the bonds, so the process is endothermic.

b) $(1/2\times 436) + \boxed{1/2\ E(Cl-Cl)} - 431 = -92$

$= 1/2 \times 436 + (-431) = -213 \Rightarrow E1/2\ (Cl-Cl) - 92 + 213 \Rightarrow 121\ kJmol^{-1}$

$\Rightarrow E(Cl-Cl) \Rightarrow \frac{121}{0.5} \Rightarrow 242\ kJmol^{-1}$ //.

c) Eq:- $\frac{1}{2} H_2(g) + \frac{1}{2} F_2(g) \rightarrow HF(g)$ $\quad \Delta_f H = y\ kJmol^{-1}$

So, $y = (1/2\times 436) + (1/2\times 158) - 562 \Rightarrow -265\ \Delta_f H$

$\therefore \Delta_f H\ [HF_{(g)}] = -265\ kJmol^{-1}$ //

10a) The enthalpy change when one mole of water is formed by neutralisation of acid with alkali.

b) Burette & volumetric pipette

c) To make sure that all the acid is neutralised.

d i) $\Delta T = 33.6^\circ C - 20^\circ C \Rightarrow 13.6\ K$

To find mol $\Rightarrow n(HCl) = n(H_2O) \Rightarrow (0.0500\times 2.00) = 0.100\ mol$. KJ→J ÷1000

1 g/cm³ = 100 g $\quad Q = 100.0\ g \times 4.18\ Jg^{-1}K^{-1} \times 13.6\ K \Rightarrow 5684.8\ J \Rightarrow 5.68\ J$

$\therefore \Delta H = \frac{-Q}{n} = \frac{-5.68}{0.100} \Rightarrow -56.8\ kJmol^{-1}$ //.

11a i) ΔH = Bonds broken − Bonds formed $\Rightarrow [(3\times 412)+(360+(496\times 1.5))] - [(743\times 2)+(463\times 4)] \Rightarrow -535\ kJmol^{-1}$

b) B

c) $6E(S-F) = 1000 + 223 + (3\times 158) = 1797$

$= E(S-F) = \frac{1797}{6} \Rightarrow +299.5\ kJmol^{-1}$ //.