Q1(A):

Group 15 elements have $\boxed{5}$ valence electrons.

Q1(B):

The atom with smaller atomic size and larger number of protons will have stronger electric attraction and hence higher first ionisation energy. Therefore, $\boxed{He}$ has the highest first ionisation energy.

Q1(C):

$\boxed{\text{Metals}}$ have deionised electrons that can conduct electricity and heat at their solid states.

Q1(D):

Using the hints provided, we check the name of each compound:

(1): Hydrogen ox<u>ide</u>

(2): Sulphur triox<u>ide</u>.

(3): Carbon monox<u>ide</u>.

(4): Titanium (IV) ox<u>ide</u>.

$\boxed{(5)}$: Oxyegn

Q1(E):

$\boxed{\text{Ether}}$ groups are $-O-$, where the O atom and its nearby C atoms are not joint by double bond.

Q2:

(A): Ions have the same electronic configuration only if they have the same number of electrons. Among the 5 options, only $\boxed{KCl}$, where both K^+ and Cl^- has 18 electrons statisfying it.

(B):

(1): Linear

(2): Linear

(3): Tetrahedral

$\boxed{(4)}$: Bent

(5): Trigonal pyramidal.

(C): O_2 contains an $O = O$ double bond and each O atom has 6 outermost shell electrons.

The Lewis structure is hence $\boxed{(2)}$.

Note: The lone pair electrons are usually plotted as "paired".

Q3:

(A) The assumption suggests that the oxidation number of H and O are +1 and -2 respectively.

Therefore, the oxidation number of Cl=$4 \cdot 2 - 1 = \boxed{+7}$.

(B): The full equation is $2MnO_4^- + 16H^+ + 10I^- \rightarrow 2Mn^{2+} + 5I_2 + 8H_2$.

Therefore, the ratio is $\boxed{\frac{2}{10}}$.

(C): Consider the molar ratio, as $\frac{50.0}{39.1+54.9+4 \cdot 16.0}$ mol of $KMnO_4$ is used, $\frac{5}{2} \cdot \frac{50.0}{39.1+54.9+4 \cdot 16.0}$ mol, i.e. $\frac{5}{2} \cdot \frac{50.0}{39.1+54.9+4 \cdot 16.0} \cdot (2 \cdot 126.9) \approx \boxed{200.8\ g}$ of I_2 is formed.

Q4:

(A): By the provided information, $\Delta H_f[CO_2] = -394\ kJ/mol$, $\Delta H_f[H_2O] = -286\ kJ/mol$ and $\Delta H_f[CH_4] = -75\ kJ/mol$.

Therefore, $\Delta H_c[CH_4] = -394 - 2 \cdot 286 + 75 = -\boxed{891}\ kJ/mol$.

(B): Following the instruction:

$\boxed{(1)}$: $\frac{286}{2 \cdot 1.0} = 143\ kJ/g$.

(2): $\frac{394}{12.0} \approx 32\ kJ/g$.

(3): $\frac{891}{12.0+4 \cdot 1.0} \approx 55\ kJ/g$.

(4): $\frac{3 \cdot 394 + 4 \cdot 286 - 105}{3 \cdot 12.0 + 8 \cdot 1.0} \approx 50\ kJ/g$

Q5:

(A): $3\cdot\frac{5}{1000}\ mol$, i.e. $3\cdot\frac{5}{1000}\cdot(65.4+32.1+4\cdot16.0) \approx \boxed{2.42\ g}$ of $ZnSO_4$ is formed.

(B): [NaOH]=$\frac{\frac{2.3}{23.0}}{1.0} = 0.1\ mol/L$.

Therefore, pOH of the resultant solution=1.

By pH+pOH=14, pH=$\boxed{13}$.

(C): The catalyst for Haber process is $\boxed{Fe}$.

(D): For concentrated solution of NaCl, Cl^- are oxidised to Cl_2 and H^+ are dissociated from H_2O and reduced to H_2.

Therefore, at the anode, we have $2Cl^- \rightarrow Cl_2 + 2e^-$.

At the cathode, we have $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$.

$\boxed{(2)}$

Note: I think the equation $2H^+ + 2e^- \rightarrow H_2$ will be more suitable as H_2O decomposed as the result of the shift in equilibrium. However, when asked the overall reaction, the equation $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$ does explain the situation better.

Q6:

(A): The molar ratio $C : H = \frac{17.1}{12.0} : \frac{20.0-17.1}{1.0} \approx 1 : 2$.

Therefore, the empirical formula is $\boxed{CH_2}$.

(B): Considering the number of moles:

$$\frac{2.0}{22.4} = \frac{5.0}{m}$$

$$m = \boxed{56}$$

(C): Solving $n(12.0 + 2 \cdot 1.0) = 56$, we have $n = 4$, i.e. the compound is C_4H_8.

If the compound is non-cyclic, it is an alkene.

Therefore, there are $\boxed{4}$ isomers:

But-1-ene, Cis-but-2-ene, Trans-but-2-ene and 2-methylpropene