Q1:

$\boxed{Mn}$ is a transition metal.

Q2:

The number of neutrons is equal to the mass number minus the number of protons (i.e. the atomic number).

(1): 4-2=2

(2): 14-7=7

(3): 16-8=8

(4): 32-16=16

$\boxed{(5)}$: 39-19=20$\neq$19

Q3:

Noble gases have no valence electrons. Therefore, $\boxed{Ne}$ has the smallest number of valence electrons.

Q4:

The number of shared electron pairs and lone pairs are respectively:

$\boxed{(1)}$: 4, 4

(2): 3, 2

(3): 2, 4

(4): 6, 0

(5): 3, 1

Q5:

As NH_4^+ ions absorb OH^- ions to reach an equilibrium, by Brønsted–Lowry acid–base definition, $\boxed{NH_4Cl}$ is acidic.

Q6:

$[OH^-] = \frac{\frac{0.10}{23.0+16.0+1.0}}{\frac{250}{1000}} = 0.01\ mol/L.$

Therefore, pOH$= -\log[OH^-] = 2$.

By pH+pOH=14, we have pH=14-2=$\boxed{12}$.

Q7:

Number of moles of $H^+ = 2 \cdot 1.0 \cdot \frac{10}{1000} = 0.02\ mol$.

Number of moles of $OH^- = \frac{1.0}{23.0+16.0+1.0} = 0.025\ mol$.

Therefore, $0.005\ mol$, i.e. $0.005 \cdot 40 = 0.20\ g$ of NaOH is left $\boxed{(3)}$.

Q8:

$\rho = \frac{M}{V} = \frac{m_A}{22.4} = \frac{2 \cdot 1.0}{22.4} \approx \boxed{0.089\ g/L}$.

Q9:

Let x g be the mass of KNO_3, by considering the solubility, we have

$\frac{x}{100-x} = \frac{169}{100}$, i.e. $x \approx 62.83$.

Let y g the the mass of KNO_3 crystallised out, by considering the solubility, we have $\frac{62.83-y}{100-62.83} = \frac{40}{100}$, i.e. $y \approx \boxed{48}$.

Q10:

$0.25 \cdot \frac{822}{2} \approx \boxed{103\ kJ}$.

Q11:

The changes are:

(1): $+1 \to 0$

(2): $0 \to -1$

(3): $+4 \to 0$

(4): $-1 \to -2$

$\boxed{(5)}$: $+4 \to +6$

Q12:

The overall equation is $2MnO_4^- + 5Sn^{2+} + 16H^+ \to 2Mn^{2+} + 5Sn^{4+} + 8H_2O$.

Considering the molar ratio $MnO_4^- : Sn^{2+} = 2 : 5$, we have

$5 \cdot 0.20 \cdot \frac{9.5}{1000} = 2 \cdot M \cdot \frac{20}{1000}$, i.e. $M \approx \boxed{0.24\ mol/L}$

Q13:

The half equation is $Cu^{2+} + 2e^- \rightarrow Cu$.

$Q = It = 1.93 \cdot (8 \cdot 60 + 20) = 965\ C = \frac{965}{9.65 \times 10^4}\ F = 0.01\ F$.

Therefore, number of moles of Cu deposited=$0.01 \cdot \frac{1}{2} = 0.005\ mol$.

The mass=$0.005 \cdot 64 = \boxed{0.320\ g}$.

Q14:

By $pV = nRT$, $1.0 \cdot \frac{831}{1000} = \frac{1.15}{m} \cdot 0.0831 \cdot (127 + 273)$, i.e. $m = \boxed{46}$.

Q15:

The reaction is $H_2 + I_2 \iff 2HI$.

As 3.2 mol of HI is produced, 1.6 mol of reactants are consummed and 0.4 mol are left.

$K_C = \frac{3.2^2}{0.4 \cdot 0.4} = \boxed{64}$

Q16:

$0 - 1.85 \cdot \frac{1}{\frac{500}{1000}} \cdot \frac{68.4}{342} = \boxed{-7.40 \times 10^{-1}\ ^\circ C}$

Q17:

The compound is either an alcohol or an ether.

Alcohol: Propan-1-ol, Propan-2-ol

Ether: Ethylmethylether

Totally $\boxed{2}$ isomers.

Q18:

Aldehydes can undergo the silver mirror reaction.

Only $\boxed{HCOOH}$ is an aldehyde.

Q19:

Dehydration occurs and $\boxed{CH_2 = CH_2}$ is formed.

Q20:

The molar ratio $C : H : O = \frac{54.5}{12.0} : \frac{9.1}{1.0} : \frac{36.4}{16.0} \approx 2 : 4 : 1$.

Therefore, the empirical formula is C_2H_4O.

Solving $n(2 \cdot 12.0 + 4 \cdot 1.0 + 16.0) = 88$, we have $n = 2$.

Therefore, the molecular formula is $\boxed{C_4H_8O_2}$.