Typo

For each of the following three reactions, in part (i) write a BALANCED equation and in part (ii) answer the question about the reaction. In part (i), coefficients should be in terms of lowest whole numbers. Assume that solutions are aqueous unless otherwise indicated. Represent substances in solutions as ions if the substances are extensively ionized. Omit formulas for any ions or molecules that are unchanged by the reaction.
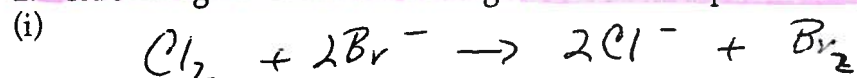
1. Solid sodium oxide is added to distilled water..
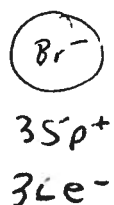
(i) $Na_2O + H_2O \rightarrow 2Na^+ + 2OH^-$

(ii) Is the substance that is produced a strong, weak or nonelectrolyte? Explain your answer.

NaOH is a strong base & therefore a strong electrolyte

2. Chlorine gas is bubbled through a solution of potassium bromide

(i) $Cl_2 + 2Br^- \rightarrow 2Cl^- + Br_2$

(ii) Which is a lager a bromine atom or a bromide ion. Explain your answer.

Br
○
35p+
35e-

(Br⁻)
35p⁺
36e⁻

Since Br⁻ has an additional e⁻ there is more repulsion & the effective Nuclear charge decreases so the Br⁻ expands.

3. A solution of copper(II) chloride is added to a solution of sodium sulfide.

(i) $Cu^{2+} + S^{2-} \rightarrow CuS$
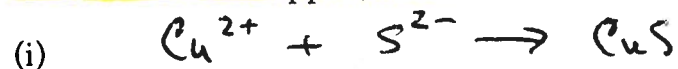
(ii) What are the colors of the two reacting solutions? resulting solution and ppt.

NaCl (aq) is colorless

CuS is blue

Al. Str. / Per. Trends

8. Suppose that a stable element with atomic number 119, symbol Q, has been discovered.

(a) Write the ground-state electron configuration for Q, showing only the valence-shell electrons.

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| $8s^1$ | One point is earned for the electron configuration. |

(b) Would Q be a metal or a nonmetal? Explain in terms of electron configuration.

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| It would be a metal (**OR** an alkali metal). The valence electron would be held only loosely. | One point is earned for the correct answer and explanation, which must include reference to the valence electron. |

(c) On the basis of periodic trends, would Q have the largest atomic radius in its group or would it have the smallest? Explain in terms of electronic structure.

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| It would have the largest atomic radius in its group because its valence electron is in a higher principal shell. | One point is earned for the correct answer and explanation; the size must refer to number of electron shells. |

(d) What would be the most likely charge of the Q ion in stable ionic compounds?

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| + 1 | One point is earned for the correct charge. (Must be consistent with configuration in part (a).) |

(e) Write a balanced equation that would represent the reaction of Q with water.

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| $2\,Q(s) + 2\,H_2O(l) \rightarrow 2\,Q^+\,(aq) + 2\,OH^-(aq) + H_2(g)$ | One point is earned for $H_2$ as a product.<br><br>One point is earned for balancing the equation. |

(f) Assume that Q reacts to form a carbonate compound.

   (i) Write the formula for the compound formed between Q and the carbonate ion, $CO_3^{2-}$.

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| $Q_2CO_3$ | One point is earned for the formula consistent with the charge given in part (d). |

   (ii) Predict whether or not the compound would be soluble in water. Explain your reasoning.

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| It would be soluble in water because all alkali metal carbonates are soluble. | One point is earned for the answer consistent with the identification of Q. |