MULTIPLE CHOICE

1. **ANS: D**
   
   The valence electrons are those in the highest unfilled energy level. Therefore the valence electrons are the two 4s electrons.

   **PTS:** 1

2. **ANS: B**

   \[
   5200 \text{ A} \times \frac{1 \text{ m}}{10^{10} \text{ A}} = 5.2 \times 10^{-7} \text{ m}
   \]

   \[
   E = h\nu = \frac{hc}{\lambda} = \frac{(6.63 \times 10^{-34} \text{ Js})(3.00 \times 10^{8} \text{ m/s})}{5.2 \times 10^{-7} \text{ m}} = 3.8 \times 10^{-19} \text{ J}
   \]

   **PTS:** 1

3. **ANS: C**

   \[
   \Delta T = \frac{q}{mx} = \frac{505 \text{ J}}{11.3 \text{ g} \times 4.18 \text{ J/gC}} = 10.7 \text{ C}
   \]

   \[
   T_f = T_i + \Delta T = 28.3 + 10.7 = 39.0 \text{ C}
   \]

   **PTS:** 1

4. **ANS: A**

   Reverse equation 1 \( \Delta H = -83.7 \text{ kJ} \)

   Divide equation 2 by 2 \( \Delta H = 90.2 \text{ kJ} \)

   Leave equation 3 as is \( \Delta H = 33.2 \text{ kJ} \)

   Add the 3 modified equations \( \Delta H = 39.7 \text{ kJ} \)

   **PTS:** 1

5. **ANS: D**

   \[
   99.1 \text{ Mz} = 9.91 \times 10^7 \text{ s}^{-1}
   \]

   \[
   \lambda = \frac{c}{v} = \frac{3.00 \times 10^8 \text{ m/s}}{9.91 \times 10^7 \text{ s}^{-1}} = 3.03 \text{ m}
   \]

   **PTS:** 1

6. **ANS: C**

   Atomic radius decreases across a period and increases down a group. Therefore the element furthest to the right and highest in the group would be the smallest.

   **PTS:** 1
7. ANS: D
Na has one 3s unpaired electron, therefore it is paramagnetic. All the other elements have no unpaired electrons and are diamagnetic.

PTS: 1

8. ANS: C
In the second experiment 5 times less heat is produced (5 times less reactants). Since 5 times less heat is used to heat 5 times less solution, the change in temperature would be the same for both experiments.

PTS: 1

9. ANS: B
\[
725 \text{ kJ} \times \frac{2 \text{ mol Fe}}{850 \text{ kJ}} \times \frac{55.85 \text{ g}}{1 \text{ mol Fe}} = 95 \text{ g}
\]

PTS: 1

10. ANS: D
The possible number of orbitals on any energy level is \( n^2 \).

PTS: 1

11. ANS: A
IE and EA values increase as one moves across a period from left to right.

PTS: 1

12. ANS: D
The maximum number of electrons on any energy level is \( 2n^2 \).

PTS: 1

13. ANS: B
See periodic table for energy order of orbitals.

PTS: 1

14. ANS: C
IE\(_1\) values are highest on the top right corner and lowest on lower left corner of periodic table.

PTS: 1

15. ANS: A
d orbital has \( l=2 \) value. Therefore the possible \( m_l \) values would be -2 to +2.

PTS: 1