Practice Test 2A
Answer Section

MULTIPLE CHOICE

1. ANS: B
   Diffraction is a property of waves.

   PTS: 1
2. ANS: C
   The solution of the wave equations describes the probability of finding an electron and is called an orbital.

   PTS: 1
3. ANS: A
   Since heat is included as a reactant, the reaction is endothermic. In endothermic reactions, enthalpy of the product is greater than the enthalpy of the reactant, leading to a positive enthlapy change value.

   PTS: 1
4. ANS: A
   $\Delta E_{sys} = q + w = -155\text{ kJ} - 22\text{ kJ} = -177\text{ kJ}$

   $\Delta E_{surr} = -\Delta E_{sys} = +177\text{ kJ}$

   PTS: 1
5. ANS: C
   $$\lambda = \frac{h}{mv} = \frac{6.626\text{x}10^{-34}\text{ Js}}{(9.11\text{x}10^{-31}\text{ kg})(1.85\text{x}10^{7}\text{ m/s})} = 3.93\text{x}10^{-11}\text{ m}$$

   $$\nu = \frac{c}{\lambda} = \frac{3.00\text{x}10^{8}\text{ m/s}}{3.93\text{x}10^{-11}\text{ m}} = 7.63\text{x}10^{18}\text{ s}^{-1}$$

   PTS: 1
6. ANS: C
   $q = C_{cal} \times \Delta T = (6.18\text{ kJ/°C})\ (27.3\text{ °C}) = -168.7\text{ kJ}$ (neg. sign; exothermic)

   $$3.80\text{ g} \times \frac{1\text{ mol}}{114.26\text{ g}} = 0.03326\text{ mol}$$

   $$\Delta H = \frac{-168.7\text{ kJ}}{0.03326\text{ mol}} = -5.07\text{x}10^{3}\text{ kJ/mol}$$

   PTS: 1

7. ANS: B

$$E = \frac{hc}{\lambda} = \frac{(60626\text{x}10^{-34}\ \text{Js})(3.00\text{x}10^{8}\ \text{m/s})}{5.52\text{x}10^{-7}\ \text{m}} = 3.60\text{x}10^{-19}\ \text{J/photon}$$

$$3.60\text{x}10^{-19}\ \text{J/photon} \times \frac{6.02\text{x}10^{23}\ \text{photons}}{1\ \text{mol photons}} = 2.17\text{x}10^{5}\ \text{J}$$

PTS: 1

8. ANS: C
Substances with low specific heat will gain and lose heat easily. Therefore the lowest specific heat will attain the highest temperature.

PTS: 1

9. ANS: C
Blue light is to the left of the red light in the electromagnetic spectrum. Therefore it has higher frequency but shorter wavelength than red light.

PTS: 1

10. ANS: D
See lecture notes.

PTS: 1

11. ANS: C

$$1.888\ \text{g}\ H_2 \times \frac{1\ \text{mol}}{2.016\ \text{g}} \times \frac{2\ \text{mol}\ H_2O}{2\ \text{mol}\ H_2} = 0.9365\ \text{mol}\ H_2O$$

$$\Delta H = \frac{226.4\ \text{kJ}}{0.9365\ \text{mol}\ H_2O} \times 2 = -483.5\ \text{kJ/2 mol}\ H_2O \qquad \text{(neg sign; exothermic)}$$

PTS: 1

12. ANS: C
Choice A is wrong since m_s cannot have a value of –1
Choice B is wrong since l cannot be 3 if n is 3
Choice C is wrong since m_l cannot be +3+ if l is 2
Therefore choice D is correct

PTS: 1

13. ANS: D
Energy is directly proportional to frequency. Therefore the higher the frequency of the wave, the greater its energy.

PTS: 1

14. ANS: B
Heat flows from the surroundings into the system in an endothermic process.

PTS: 1

15. ANS: A

$\frac{1}{\lambda} = 1.097 \text{ x } 10^{7} \left(\frac{1}{9} - \frac{1}{25} \right) = 1.282 \text{ x } 10^{-6} \text{ m} = 1282 \text{ nm}$

PTS: 1