Unit Test Review Key

Heat $q = mC\Delta T$ $\Delta T = T_f - T_i$

1) $q = ?$
$m = 8.00\,g$
$C = .13\,J/g\,^\circ C$
$\Delta T = 39.4^\circ C - 31.0^\circ C = 8.4^\circ C$

$q = (8.00\,g)(.13\,J/g\,^\circ C)(8.4^\circ C)$

$\boxed{q = 8.7\,J}$ endothermic

2) $q = 1462.5\,J$
$m = ?$
$C = .45\,J/g\,^\circ C$
$\Delta T = 32.0^\circ C - 19.0^\circ C = 13.0^\circ C$

$1462.5\,J = m(.45\,J/g\,^\circ C)(13.0^\circ C)$

$\frac{1462.5\,J}{5.85\,J/g} = \frac{m(5.85\,J/g)}{5.85\,J/g}$

$\boxed{250\,g = m}$ endothermic

3) $q = -618\,J$
$m = 100.0\,g$
$C = 2.09\,J/g\,^\circ C$
$\Delta T = ?$

$-618\,J = (100.0\,g)(2.09\,J/g\,^\circ C)\,\Delta T$

$\frac{-618\,J}{209\,J/^\circ C} = \frac{(209\,J/^\circ C)\,\Delta T}{209\,J/^\circ C}$

$\boxed{-2.96^\circ C = \Delta T}$ exothermic

4) $q = ?$
$m = 505.0\,g$
$C = .38\,J/g\,^\circ C$
$\Delta T = 20^\circ C - 100^\circ C = -80^\circ C$

$q = (505.0\,g)(.38\,J/g\,^\circ C)(-80^\circ C)$

$q = -152\,J = \boxed{-200\,J}$ exothermic

5. $4HCl(aq) + O_2(g) \rightleftharpoons 2H_2O(l) + 2Cl_2(g)$

A) $K_{eq} = \dfrac{[Cl_2]^2}{[HCl]^4[O_2]}$

B) $K_{eq} = \dfrac{[1.25]^2}{[1.50]^4[.950]} = .325$

C)

$$.00888 = \frac{[Cl_2]^2}{[1.14\times10^{-5}]^4[3.21\times10^{-5}]}$$

$$.00888 = \frac{[Cl_2]^2}{5.421562113\times10^{-25}}$$

$$[Cl_2]^2 = (.00888)\cdot(5.421562113\times10^{-25})$$

$$\sqrt{[Cl_2]^2} = \sqrt{4.81\times10^{-27}}$$

$$[Cl_2] = 6.94\times10^{-14}$$

6. $A(g) + B(aq) \rightleftharpoons Cu(s) + \text{heat}$ (exothermic) $\quad \Delta H_{rxn} = -453\ kJ/mol$

A) shift to the left, side w/ most moles

B) shift to the left, to reduce heat

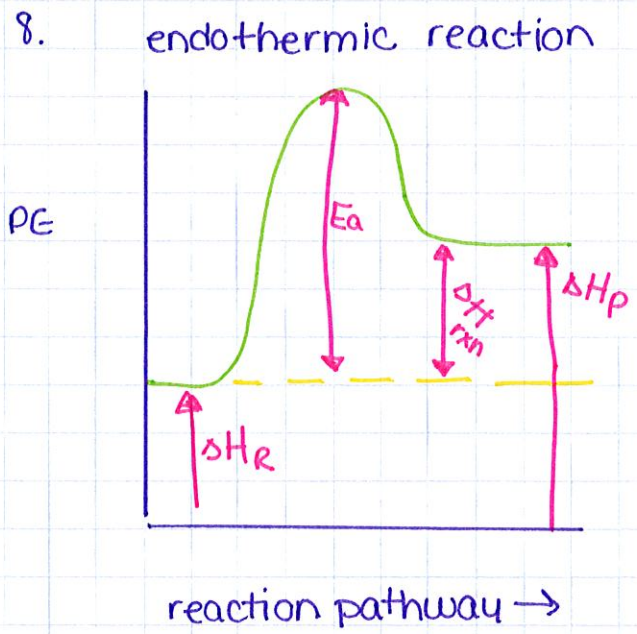
C) no shift

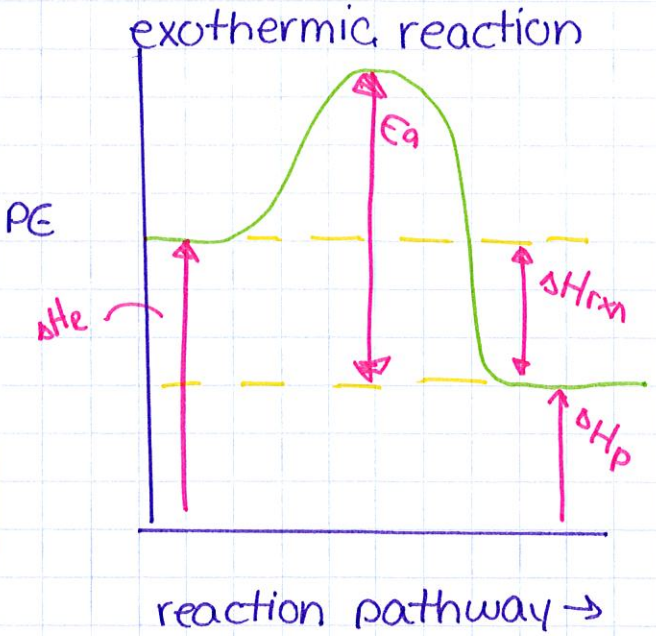
D) shift to the right, to remove extra B

E) shift to the left, to replenish A

7. • nature of reactants - solids react slower than liquids which react slower than gases
• concentration - the higher the concentration, the faster the rate of reaction (more collisions)
• surface area - the greater the surface area, the greater the rate. (more collisions)
• temperature - the higher the temperature, the faster the rate. (more energy)
• catalyst - lowers activation energy (E_a)

8.





9.