## Multiple Choices

(1) 100 g of metal absorbs 1000 J as its temperature change (from 25 to 45 °C). The specific heat of the metal (in J/g °C) is:

(A) 10 (B) 0.5 (C) 5 (D) 50

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(2) From the following information $\Delta H_f^o$ ( $C_3H_6O(l)$) is (in kJ/mol):

$C_3H_6O(l) + 4O_2(g) \longrightarrow 3CO_2(g) + 3H_2O(l)$ $\Delta H$=-1789.9kJ

$\Delta H_f^o$ ($CO_2(g)$) = -393.5 kJ/mol and $\Delta H_f^o$ ($H_2O(l)$) = -285.8kJ/mol

(A) +328 (B) -226 (C) +248 (D) -248

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(3) From the following information:

$H_2(g) + F_2(g) \longrightarrow 2HF(g)$ $\Delta H$= -537kJ

$C(graphite) + 2F_2(g) \longrightarrow CF_4(g)$ $\Delta H$= -680kJ

$2C(graphite) + 2H_2(g) \longrightarrow C_2H_4(g)$ $\Delta H$= +52kJ

$\Delta H$ (in kJ) of this reaction $C_2H_4(g) + 6F_2(g) \longrightarrow 2CF_4(g) + 4HF(g)$ is:

(A) -2538 (B) -2486 (C) -2382 (D) -2330

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(4) From the following information:

$C_{12}H_{12}O_{11}(s) + 12O_2(g) \longrightarrow 12CO_2(g) + 11H_2O(l)$ $\Delta H$ = -5650kJ

The mass (in g) of $C_{12}H_{12}O_{11}(s)$ needed to obtain $\Delta H$ = -170.18kJ is:

(A) 10 (B) 16 (C) 14 (D) 12

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(5) Given $\Delta H_f^o$ ($NH_3(g)$) = -46 kJ/mol. Calculate the change in internal energy, $\Delta E^o$ (in kJ) of this reaction $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

(A) -51 (B) -41 (C) -87 (D) -97

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(6) 500.0 g of water at 23 °C was cooled down and release 31380 J.

Knowing that the specific heat of water is 4.184 J/g °C, the new temperature of water in °C is:

(A) 10 (B) 5 (C) 6 (D) 8

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(7) The solubility of $N_2$ gas in water at 25 °C and $N_2$ partial pressure = 0.76 atm is $5.2\times10^{-4}$ mol/*l*. What is the partial pressure of nitrogen (in atm) at which its solubility in water is $1.71\times10^{-3}$ mol/ *l* at 25 °C?

A) 2.7 B) 2.5 C) 2.3 D) 2.1

8) Benzene, $C_6H_6$, and toluene, $C_7H_8$, form ideal solution that has a total vapor pressure of 1.0 atm. What is the mole fraction of benzene in this solution?
$P^{o}_{(Benzene)}$ =1.326 atm and $P^{o}_{(Toluene)}$ =0.532 atm

(A) 0.59 (B) 0.56 (C) 0.62 (D) 0.64

(9) The molar mass of a chemical that is non-volatile and non-electrolyte is $6.8\times10^{4}$ g/mole. What is the osmotic pressure (in mmHg) at 27°C of 200 m*l* aqueous solution containing 8.0 g of this chemical?

(A) 9.0 (B) 11.0 (C) 13.0 (D) 14.0

(10) 0.05 molal of $CaCl_2$ aqueous solution freeze at –0.27°C.
What is the Vant's Hoff factor (i) of $CaCl_2$ ?
($K_f$ water = 1.86 °C/m)

(A) 3.0 (B) 2.7 (C) 2.9 (D) 2.8

(11) The unit of the rate constant for zero order reaction is:

(A) mol $l^{-1}$ (B) $s^{-1}$ (C) $l$ $mol^{-1}$ $s^{-1}$ (D) mol $l^{-1}$ $s^{-1}$

(12) A first order reaction has a rate constant of $7.5\times10^{-3}$ $s^{-1}$. The time (in seconds) needed for the reaction to be 60% complete is:

(A) 116.17 (B) 118.17 (C) 122.17 (D) 112.17

(13) For this reaction: $A + 3B \rightarrow 2D$ , The rate of D appearance is:

(A) Faster than A disappearance
(B) Faster than B disappearance
(C) Slower than A disappearance
(D) Equal to A disappearance

(14) From this information:

| Exp. | $[NO]_o$ (M) | $[H_2]_o$ (M) | Initial rate (M/s) |
|---|---|---|---|
| 1 | 0.273 | 0.763 | 2.83 |
| 2 | 0.273 | 1.526 | 2.83 |
| 3 | 0.819 | 0.763 | 25.47 |

The rate law for this reaction $2NO + H_2 \longrightarrow N_2O + H_2O$ is:

(A) Rate= $k[NO]^2[H_2]$ (B) Rate= $k[NO][H_2]^2$ (C) Rate= $k[NO]^2[H_2]^2$ (D) Rate= $k[NO]^2$

(15) **A** $\longrightarrow$ **B** is a first order reaction. Which of the following statements is true?

(A) $t_{½}$ increases as $[A]_o$ increases.
(B) $t_{½}$ decreases as $[A]_o$ increases.
(C) $t_{½}$ decreases as (the rate constant) increases.
(D) $t_{½}$ increases as (the rate constant) increases.

THE END