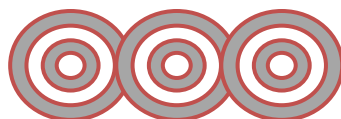




# CHEM 101+103



## Second Exam Sample 1

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**1. The sign of  $\Delta H$  for the process  $\text{CO}_2(\text{s}) = \text{CO}_2(\text{g})$  is: ((the symbol “H” means enthalpy))**

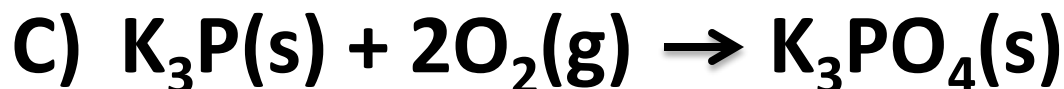
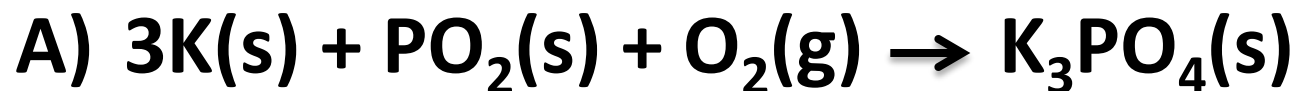
**A) Positive and  $H_{\text{CO}_2}(\text{s}) > H_{\text{CO}_2}(\text{g})$**

**B) Positive and  $H_{\text{CO}_2}(\text{g}) > H_{\text{CO}_2}(\text{s})$**

**C) Negative and  $H_{\text{CO}_2}(\text{s}) > H_{\text{CO}_2}(\text{g})$**

**D) Negative and  $H_{\text{CO}_2}(\text{g}) > H_{\text{CO}_2}(\text{s})$**

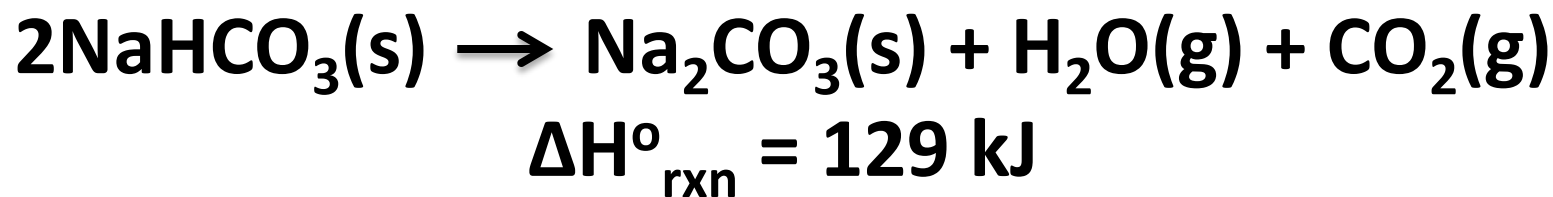
**2. Which of the  $\Delta H^\circ_{\text{rxn}}$  of the following equations represents  $\Delta H^\circ_{\text{f, K}_3\text{PO}_4(\text{s})}$ ?**



**3. A balanced chemical equation with specified value of  $\Delta H$  and states of substances is called:**

- A) A thermochemical equation**
- B) A combustion reaction**
- C) The first law of thermodynamics**
- D) Hess's law**

**4. Change in internal energy ( $\Delta E^\circ$ ), in kJ, of the following reaction is:**



A) 121.04

B) 134.04

**C) 124.04**

D) 114.04

**5.** If 10.0 g of a metal ( $C_s = 0.896 \text{ J/g K}$ ) at 298 K is supplied with 313.5 J of heat, its final temperature, in K, will be:

A) 353

**B) 333**

C) 323

D) 373

$$q = C_s \times m \times \Delta T$$

**6.** From table below,  $\Delta H^\circ_{\text{rxn}}$  of the following reaction, in KJ, is:



Compound	$\text{PH}_3(\text{g})$	$\text{PCl}_3(\text{g})$	$\text{HCl}(\text{g})$
$\Delta H_f/\text{KJ mol}^{-1}$	+ 5.40	- 288.07	- 92.30

**A) 570.37**

**B) 507.37**

**C) 705.37**

**D) 750.37**

$$\begin{aligned}\Delta H &= H_{\text{final}} - H_{\text{initial}} \\ &= H_{\text{products}} - H_{\text{reactants}}\end{aligned}$$

**7.** Knowing that:



the number of kilojoules (KJ) released if 100 g of HCl(g) is produced, is:

A) 235.17

B) 325.17

C) 523.17

**D) 253.17**

**8. The process of surrounding solute particles by solvent particles is known as:**

**A) Dilution**

**B) Formation**

**C) Solvation**

**D) Osmosis**

**9. The solubility of .....?.....in liquid is highly affected by changing pressure**

- A) Gases**
- B) Liquids**
- C) Solids**
- D) Salts**

**10.** If 0.1 mol of solid glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) is dissolved in the same mass of each of the following solvents:

Solvent	Q	X	Y	Z
$K_b/C \text{ molal}^{-1}$	0.4	1.53	1.7	0.5

the solvent which its boiling point is elevated more is:

A) Q

B) X

**C) Y**

D) Z

$$\Delta T_b = K_b m$$

**11.** The magnitudes of the molal constant of boiling point elevation ( $K_b$ ) depend on:

- A) Temperature
- B) Pressure
- C) Nature of solute
- D) Nature of solvent**

**12.** The aqueous solution with the highest boiling point is:

A) 0.1 M HI

**B) 0.1 M  $(\text{NH}_4)_3\text{PO}_4$**

C) 0.2 M  $\text{C}_2\text{H}_5\text{OH}$

D) 0.1 M  $\text{NH}_4\text{Cl}$

**13.** If 1 L carbonated water is bottled under pressure of 2.4 atm of  $\text{CO}_2(\text{g})$ , and Henry's law constant is  $3.36 \times 10^{-2} \text{ mol/L atm}$ , the number of grams of dissolved  $\text{CO}_2(\text{g})$  is:

A) 5.35

B) 53.5

C) 35.5

**D) 3.55**

**14.** At 30 °C, the osmotic pressure, in torr, of 0.108 M aqueous solution of a salt that is assumed to be totally ionized into three ions is:

A)  $3.16 \times 10^3$

B)  $1.63 \times 10^3$

**C)  $6.13 \times 10^3$**

D)  $1.36 \times 10^3$

**15.** The minimum amount of energy required to overcome the energy barrier in a chemical reaction is the:

- A) Activation energy**
- B) Reaction's enthalpy**
- C) Reactant's kinetic energy**
- D) Reactants' heat content**

**16.** Increasing temperature increases reaction rate because it:

- A) Increases the activation energy
- B) Decreases the activation energy
- C) Increases the number of collisions**
- D) Increases the reaction enthalpy

**17.** According to the following reaction:



if 0.8 mol of  $\text{N}_2\text{O}_5$  (g) is initially put in 2L-reaction vessel and is found to be 0.0125 mol after 2 min, the rate of disappearance of  $\text{N}_2\text{O}_5$  (g), in M/min, is:

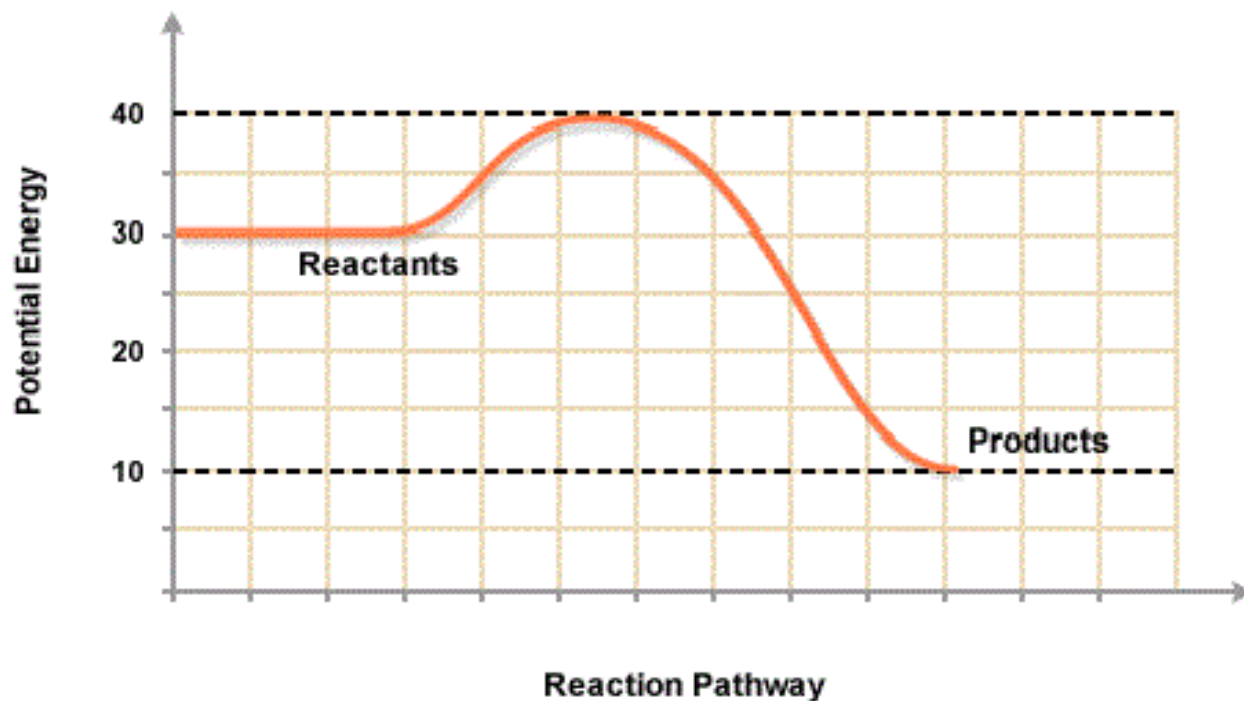
A) 0.9169

**B) 0.1969**

C) 0.6919

D) 0.9961

**18.** From the following reaction potential energy (PE) diagram:



**which of the following is correct for the forward reaction:**

	$\Delta H/\text{kJ}$	Activation energy, $E_a/\text{kJ}$	Type of reaction
A)	+ 20	10	exothermic
B)	+ 20	30	endothermic
C)	- 20	10	exothermic
D)	- 20	40	endothermic

**19.** In a first order reaction, if the concentration of the reactant changes from 0.1 M to 0.025 M in 40 minutes, the reaction rate, in M/min, when the initial concentration is 0.01 M is:

A)  $6.634 \times 10^{-4}$

B)  $6.346 \times 10^{-4}$

C)  $4.366 \times 10^{-4}$

**D)  $3.466 \times 10^{-4}$**

**20.** For the reaction:



if the value of the rate of disappearance of  $\text{N}_2\text{O}_5$  is  $6.25 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$ , the rate of appearance of  $\text{NO}_2$  is:

A)  $2.15 \times 10^{-2}$

**B)  $1.25 \times 10^{-2}$**

C)  $2.51 \times 10^{-2}$

D)  $2.51 \times 10^{-2}$

