

Química C – Semi – V. 1

Exercícios

01) C

Reação exotérmica:

- liberação de calor;
- $H_p < H_r$;
- $\Delta H = \ominus$.

02) E

Reação exotérmica:

- liberação de calor;
- diminuição de energia;
- $H_r > H_p$;
- $\Delta H = \ominus$.

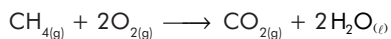
03) C

Reação endotérmica:

- absorção de calor;
- $H_p > H_r$;
- $\Delta H = \oplus$.

04) A

05) A



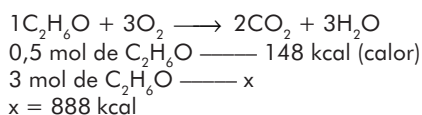
$$\Delta H = -888 \text{ kJ/mol}$$

combustão \longrightarrow exotérmica (verdadeira)

$H_r < H_p \longrightarrow$ (falsa)
calor absorvido (falsa)

06) C

Liberação de calor ($\Delta H = \ominus$)



07) A

- $\Delta H = + \text{ endo}$
- $\Delta H = - \text{ exo}$
- $\Delta H = + \text{ endo}$

$H_r > H_p$
 $\Delta H = \ominus$
reação exotérmica

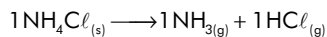
08) C



reação exotérmica

$$\Delta H = \ominus$$

09) D



$$(-75) \longrightarrow (-11) + (-22)$$

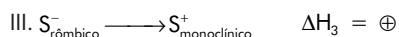
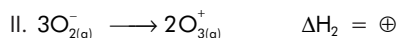
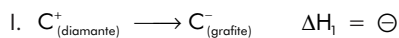
$$(-75) \longrightarrow (-33)$$

$$\Delta H = (-33) - (-75)$$

$$\Delta H = (-33) + 75$$

$$\Delta H = 42 \text{ kcal}$$

10) E

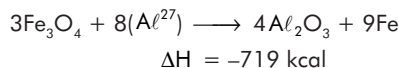


Legenda

\ominus energia

\oplus energia

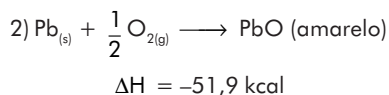
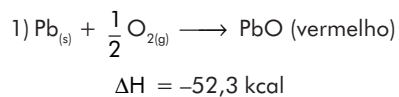
11) C



$$\begin{aligned} 8 \cdot (27 \text{ g}) &\longrightarrow 719 \text{ kcal} \\ 1 \text{ g} &\longrightarrow x \end{aligned}$$

$$x = 3,33 \text{ kcal/1 g Al}$$

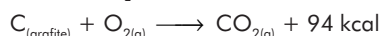
12) A



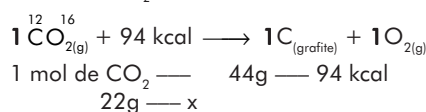
- PbO (amarelo).
- PbO (vermelho).
- 1, pois é a mais exotérmica.
- 1, porque é a mais exotérmica.

13) D

Formar CO_2 .

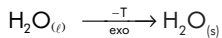


Dissociar CO_2 (contrário).



$$x = \frac{94}{2} = 47 \text{ kcal}$$

14) A



A reação é endotérmica, absorve calor e, por isso, a água congela.

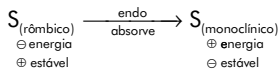
I. **Incorreta.**

II. **Correta.**

III. **Correta.**

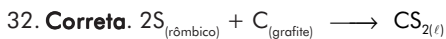
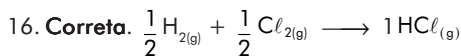
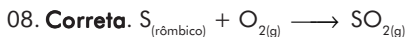
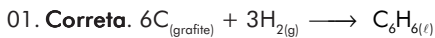
IV. **Correta.** $\Delta H = \oplus$

15) B



16) 57

Substâncias simples estáveis para formar 1 mol de uma substância composta (25 °C, 1 atm).



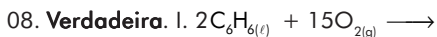
17) 26

01. **Falsa.** A reação mais exotérmica é a I.

02. **Verdadeira.** A reação III é exotérmica

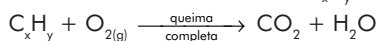
($\Delta H = \ominus$, libera calor).

04. **Falsa.** A reação que representa a substância com maior calor de combustão é a I.

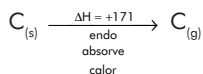


II. $2\text{C}_2\text{H}_{2(\text{g})} + 5\text{O}_{2(\text{g})} \longrightarrow$
15 é 3 vezes maior que 5.

16. **Verdadeira.** Hidrocarboneto (C_xH_y)



32. **Falsa.**



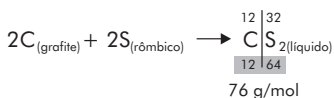
$\text{C}_{(g)} > \text{C}_{(s)}$
gasoso sólido

18) E

Substância simples:

- estável;
- 25°C/1 atm;
- $H^\circ = 0$.

19) B



3,8 g (CS_2) — 950 cal

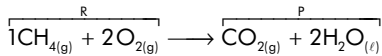
76 g (CS_2) — x

x = 19000 cal

x = 19 kcal

20) E

$$\Delta H = H_p - H_r$$



$$\Delta H = [1(\text{CO}_2) + 2(\text{H}_2\text{O})] - [1(\text{CH}_4) + 2(\text{O}_2)]$$

$$\Delta H = [1 \cdot (-393,5) + 2 \cdot (-286)] - [1 \cdot (-75) + 2 \cdot (0)]$$

$$\Delta H = [(-393,5) + (-572)] - [(-75)]$$

$$\Delta H = (-965,5) + 75$$

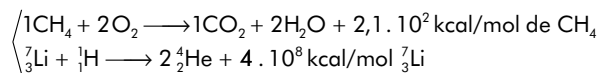
$$\Delta H = -890,5 \text{ kJ/mol de CH}_4$$

$$1 \text{ mol de } \begin{array}{l} 12 \\ \text{C} \\ 12 \end{array} \begin{array}{l} 1 \\ \text{H}_4 \\ 4 \end{array} \longrightarrow 16\text{g} \longrightarrow 890,5 \text{ kJ}$$

$$\longrightarrow 1000\text{g} \longrightarrow x$$

$$x = 55656,25 \text{ kJ}$$

21) A



Produção

$$2 \text{ mol de } {}^4_2\text{He} \longrightarrow 4 \cdot 10^8 \text{ kcal}$$

$$1 \text{ mol de } {}^4_2\text{He} \longrightarrow x$$

$$x = 2 \cdot 10^8 \text{ kcal/mol } {}^4_2\text{He}$$

$$1 \text{ mol de CH}_4 \longrightarrow 16\text{g} \longrightarrow 2,1 \cdot 10^2 \text{ kcal}$$

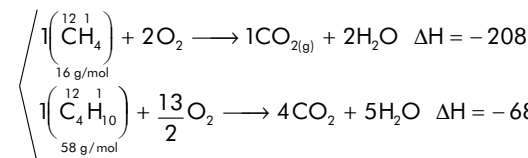
y — 2 · 10⁸ kcal

$$y = 15,238 \cdot 10^6 \text{ g}$$

$$y \cong 15,2 \text{ toneladas}$$

22) D

1 mol de qualquer gás nas CNTP (0 °C, 1 atm) ocupa 22,4 L.



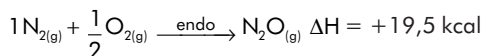
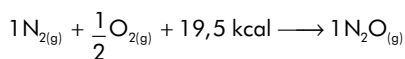
$$\text{CH}_4$$

$$208 \text{ kcal} \quad \text{_____} \quad 16 \text{ g}$$

$$x \quad \text{_____} \quad 1000 \text{ g}$$

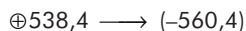
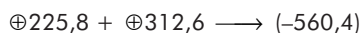
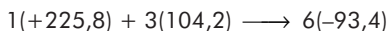
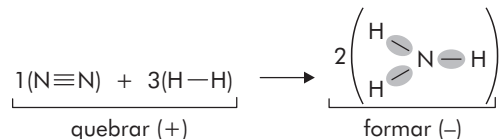
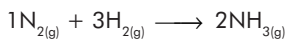
$$x = 13000 \text{ kcal}$$

23) A



24) C

Formação da NH₃ (amônia)

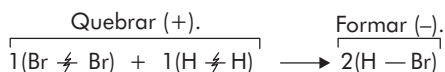
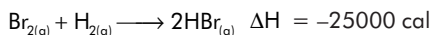


$$\Delta H = \sum \Delta H_{\text{rompidas}} + \sum \Delta H_{\text{formadas}}$$

$$\Delta H = -22 \text{ kcal (2 mol de NH}_3\text{)}$$

$$\Delta H = -11 \text{ kcal/1 mol de NH}_3$$

25) C



$$\Delta H = -25000 \text{ cal}$$

$$\Delta H = \sum \Delta H_{\text{rompidas}} + \sum \Delta H_{\text{formadas}}$$

$$-25 \text{ kcal} = [1(\text{Br}-\text{Br}) + 1(+104) + 2(-87,5)]$$

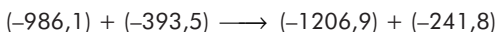
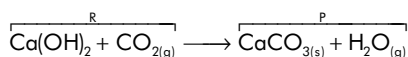
$$-25 \text{ kcal} = (\text{Br}-\text{Br}) + 104 + (-175)$$

$$(\text{Br}-\text{Br}) = -25 - 104 + 175$$

$$(\text{Br}-\text{Br}) = (-129) + 175$$

$$(\text{Br}-\text{Br}) = +46$$

26) B



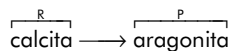
$$\Delta H = \Delta H_p - \Delta H_r$$

$$\Delta H = (-1448,7) - (-1379,6)$$

$$\Delta H = (-1448,7) + 1379,6$$

$$\Delta H = -69,1 \text{ kJ/mol}$$

27) A



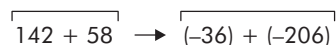
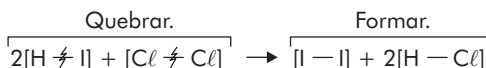
$$\Delta H = \Delta H_p - \Delta H_r$$

$$\Delta H = (-288,49) - (-288,45)$$

$$\Delta H = (-288,49) + 288,45$$

$$\Delta H = -0,04 \text{ kcal/mol}$$

28) D

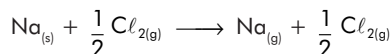


$$\Delta H = (+200) + (-242)$$

$$\Delta H = -42 \text{ kcal/2 mol HCl } (\div 2)$$

$$\Delta H = -21 \text{ kcal/1 mol HCl}$$

29) 28

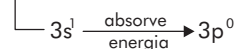
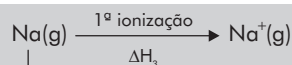


04. **Correto.**



23 g/mol absorve 26 kcal

08. **Correto.**

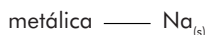
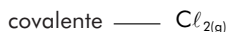


16. **Correto.**



30) 07

01. **Correto.**



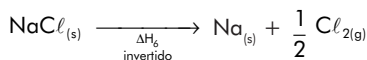
02. **Correto.**

$$\Delta H_6 = \Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4 + \Delta H_5$$

04. Correto.



08. Incorreto.



$$\Delta H_6 = \Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4 + \Delta H_5$$

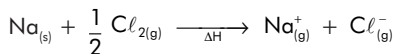
$$\Delta H_6 = (+26) + (+28,9) + (+118) + (-87,3) + (-183,8)$$

$$\Delta H_6 = (+172,9) + (-271,1)$$

$$\Delta H_6 = -98,2 \text{ (normal)}$$

$$\Delta H_6 = +98,2 \text{ (invertido)}$$

16. Incorreto.



$$\Delta H = \Delta H_1 + \Delta H_2 + \Delta H_3 + \Delta H_4$$

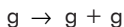
$$\Delta H = (+26) + (+28,9) + (+118) + (-87,3)$$

$$\Delta H = (+172,9) + (-87,3)$$

$$\Delta H = +85,6 \text{ kcal}$$

reação endotérmica

31) C



$$\Delta H = +$$

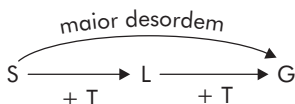
$$\Delta S = +$$

T = alta

$$\Delta G < 0$$

espontânea

32) B



33) A

$$\Delta H = +$$

$$\Delta S = +$$

$$\Delta G < 0 \text{ (espontânea)}$$

$$T = ? \text{ (alta)}$$

$$\Delta G = 0 \text{ (equilíbrio)}$$

$$\Delta G = \Delta H - T \cdot \Delta S$$

$$0 = 8,4 \cdot 10^3 - T \cdot 37$$

$$T \cdot 37 = 8,4 \cdot 10^3$$

$$T = \frac{8,4 \cdot 10^3}{37}$$

$$T = 0,227 \cdot 10^3 \text{ K}$$

$$T = 227 \text{ K}$$

$$T = -46 \text{ }^{\circ}\text{C}$$

$$T > -4,6 \text{ }^{\circ}\text{C}$$

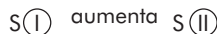
34) D

$$\Delta H = -$$

$$\Delta S = +$$

T = qualquer temperatura
processo espontâneo

35) A



36) D

T e P constantes

$$\Delta H \quad \Delta S$$

definitivo I

$$\begin{matrix} - & + \end{matrix}$$

II

$$\begin{matrix} + & - \end{matrix}$$

possíveis

III

$$\begin{matrix} - & - \end{matrix} \quad T \downarrow$$

IV

$$\begin{matrix} + & + \end{matrix} \quad T \uparrow$$

espontâneos

definitivos: I
possíveis: III e IV

37) C

$$\Delta H = -11 \text{ kcal/mol}$$

$$\Delta S = ?$$

$$\Delta G = -4,0 \text{ kcal/mol}$$

$$T = 27 \text{ }^{\circ}\text{C} \Rightarrow K = 300\text{K}$$

$$\Delta G = \Delta H - T \cdot \Delta S$$

$$-4,0 = -11 - 300 \cdot \Delta S$$

$$-4 = -11 - 300 \cdot \Delta S$$

$$300 \cdot \Delta S = -11 + 4$$

$$\Delta S = \frac{-7}{300}$$

$$\Delta S = -0,0233 \text{ kcal/K} \cdot \text{mol}$$

$$\Delta S = -23,3 \text{ cal/K} \cdot \text{mol}$$

38) E

$$\Delta H = -19,5 \cdot 10^3 \text{ kcal/mol}$$

$$\Delta S = +18 \text{ cal/K} \cdot \text{mol}$$

$$\Delta G = ?$$

$$T = 25 \text{ }^{\circ}\text{C} \Rightarrow K = 298 \text{ K}$$

$$\Delta G = \Delta H - T \cdot \Delta S$$

$$\Delta G = (-19,5 \cdot 10^3) - 298 \cdot 18$$

$$\Delta G = (-19,5 \cdot 10^3) - 5364$$

$$\Delta G = (-19500) - 5364$$

$$\Delta G = -24864 \text{ cal}$$

$$\Delta G = -24,864 \text{ kcal (espontânea)}$$

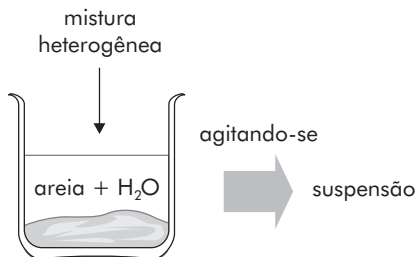
39) A

$S_8 \rightarrow$ molécula apolar
 $CS_2 \rightarrow$ molécula apolar Mistura homogênea (solução)

40) C

O enxofre não é solúvel em H_2O (soluto).
 H_2O (solvente)

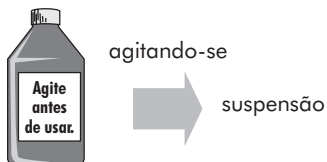
41) C



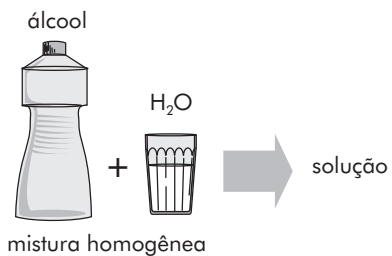
42) B

43) A

44) C



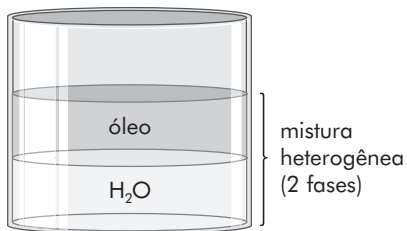
45) A



46) B

dispersão (solvente líquido) $\left\{ \begin{array}{l} 0,5 \text{ g açúcar} \\ 2 \text{ litros } H_2O \end{array} \right.$

47) B



48) A

ouro 18 quilates $\left\{ \begin{array}{l} 18 \text{ (Au)} \\ 6 \text{ (Cu)} \end{array} \right.$
 mistura homogênea (sólida)

49) D

ouro 21 quilates $\left\{ \begin{array}{l} 21 \text{ (Au) - solvente} \\ 3 \text{ (Cu) - soluto} \end{array} \right.$

50) A

$25^\circ C$
 $x \quad H_2O$
 $25 \text{ g} \quad 100 \text{ g}$

$K_s = 25 \text{ g} \mid 100 \text{ g}$
 (limite)
 $T = 25^\circ C$

51) A

$25^\circ C$
 $x \quad H_2O$
 $25 \text{ g} \quad 100 \text{ g}$

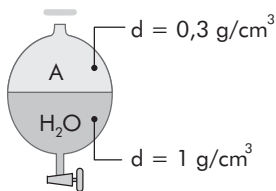
$K_s = 25 \text{ g} \mid 100 \text{ g}$

Se colocarmos 30 g de x em 100 g de H_2O , teremos 5 g de resíduo ou corpo de fundo.

52) 76

substância C (enxofre)
 $S \Rightarrow$ substância simples

A substância B (C, H, O) deve ser recristalizada em H_2O , pois é insolúvel nesse solvente.



53) 23

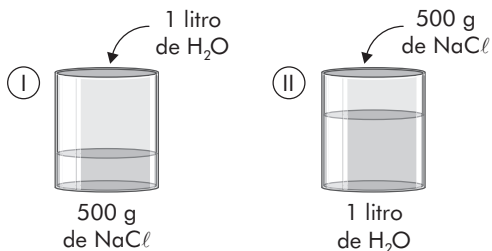


- Solvente: H₂O.
- pH < 7.
- Agitar (saída de CO₂).
- Aumentar temperatura.

refrigerante

T ↑ saída de CO₂ ↑ solubilidade ↓

54) 49



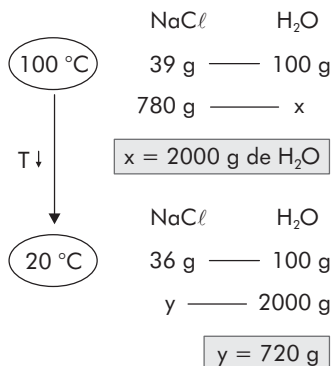
55) C

- Substância A:
- 25 °C – sólida;
 - PF alto;
 - sólido não conduz eletricidade;
 - conduz eletricidade em solução aquosa ou quando fundida.

56) D

KNO₃
 KNO₃ Solução
 52 g _____ 100 mL
 x _____ 25 mL
 x = 13 g de KNO₃

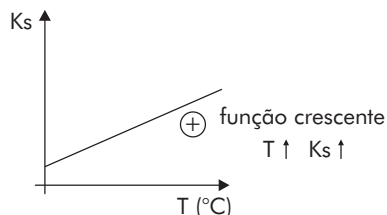
57) A



100 °C $\xrightarrow{-T}$ 20 °C
 720 g de NaCl (dissolvidos)

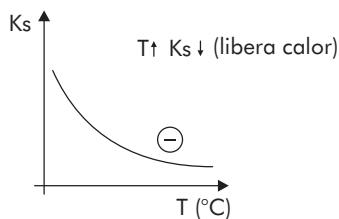
58) C

Ks ↑ solubilidade ↑



59) 45

Substância E



Sobre a linha: região saturada
 Solubilidades iguais (ponto de intersecção)
 Ks ↑ solubilidade ↑
 (+ solúvel)

60) 44

25 °C (temperatura ambiente)
 KClO₃ Ks ↓ solubilidade ↓
 (⊖ solúvel)
 ⊖ solúvel Ks ↓
 ⊕ solúvel Ks ↑