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CORRIGE BTS EEC SESSION 2011

I - DÉPERDITIONS THERMIQUES (7 pts)

A)

$$1^{\circ}) R = \frac{1}{h_i} + \sum \frac{e}{\lambda} + \frac{1}{h_e} = 2,61 \text{ m}^2 \cdot \text{K} \cdot \text{W}^{-1}$$

1 pt

$$U = \frac{1}{R} = 0,38 \text{ W} \cdot \text{m}^{-2} \cdot \text{K}^{-1}$$

1 pt

$$2^{\circ}) \varphi = U \times \Delta \theta = 11,5 \text{ W} \cdot \text{m}^2 \quad \varphi = h_i (\theta_i - \theta_{si}) = h_e (\theta_{se} - \theta_e) \quad \theta_{se} = -9,3^{\circ}\text{C} \quad \theta_{si} = 18,7^{\circ}\text{C} \sim 19^{\circ}\text{C}$$

2 pts

B)

$$1^{\circ}) \Phi = (U_1 S_1 + U_2 S_2 + U_3 S_3 + U_4 S_4) \Delta \theta$$

1 pt

$$2^{\circ}) \Phi = 7094 \text{ W} \sim 7100 \text{ W}$$

1 pt

$$3^{\circ}) E = \Phi t = 7100 \times 10 \times 24 = 1703 \text{ kWh}$$

$$C = 1703 \times 0,076 = 129,30 \sim 130 \text{ euros}$$

1 pt

II - CHAUFFE EAU SOLAIRE (7 pts)

$$1^{\circ}) V = \frac{D_v}{S} = 0,25 \text{ m s}^{-1}$$

1 pt

$$2^{\circ}) D_m = 5,0 \cdot 10^{-3} \text{ Kg s}^{-1}$$

1 pt

$$3^{\circ}) P = \frac{Q}{t} = \frac{m}{t} c \Delta \theta \quad \text{justification}$$

1 pt

$$P = D_m c \Delta \theta = 0,005 \times 4180 \times (50-15) = 731,5 \text{ W} \sim 730 \text{ W}$$

1 pt

$$4^{\circ}) \eta = \frac{731,5}{3 \times 800 + 60} \times 100 = 29,7 \%$$

0,5 pt

$$5^{\circ}) E = 350 \times 4180 \times (45-12) = 48,3 \cdot 10^6 \text{ J}$$

1 pt

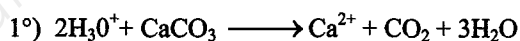
$$6^{\circ}) \text{Energie absorbée: } 800 \times 3 \times 8 \times 3600 \times 3 + 60 \times 8 \times 3 \times 3600 = 213 \cdot 10^6 \text{ J}$$

1 pt

$$\text{soit un rendement de : } \frac{48,3 \cdot 10^6}{213 \cdot 10^6} \times 100 = 22,7\%$$

0,5 pt

III - SOLUTION AQUEUSE (6 pts)



1,5 pt

$$2^{\circ}) \text{a) } C_2 = \frac{C_1 V_1}{V_2} = \frac{10 \times 10}{50} = 2 \text{ mol} \cdot \text{L}^{-1}$$

1,5 pt

$$\text{b) } n(\text{H}_3\text{O}^+) = 2 \times 50 \text{ L} = 100 \text{ mol}$$

1 pt

$$3^{\circ}) n(\text{H}_3\text{O}^+) = 100 \times 10\% = 10 \text{ mol}$$

$$n(\text{CaCO}_3) = \frac{10}{2} = 5 \text{ mol}$$

$$m(\text{CaCO}_3) = 5(40 + 12 + 48) = 500 \text{ g}$$

2 pts

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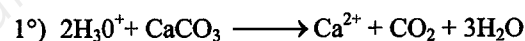
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