

الامتحان الوطني الموحد للبكالوريا
المسالك الدولية – خيار أنجليزية
الدورة الاستدراكية 2018
-عناصر الإجابة-

ⵜⴰⴳⴷⴰⵏⵜ ⵏ ⵍⵎⵎⵓⵔ
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المملكة المغربية
وزارة التربية الوطنية
والتكوين المهني
والتعليم العالي والبحث العلمي

RR27E

المركز الوطني للتقويم والإمتحانات
والتوجيه

★	مدة الإنجاز	الفيزياء والكيمياء	المادة
3	المعامل	شعبة العلوم التجريبية : مسلك علوم الحياة والأرض – خيار أنجليزية	الشعبة أو المسلك
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Chemistry (7 points)

Exercise	Question	Answer elements	Scale	Reference of the question in the Reference Framework
Chemistry (7 points)	Part 1	1. $\text{CH}_3 - \text{COOH}(\text{aq}) + \text{H}_2\text{O}(\ell) \rightleftharpoons \text{CH}_3 - \text{COO}^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$	0,5	- Write the equation of the acid-base reaction and identify the two pairs involved.
		2. The predominant chemical species CH_3COOH ; Justification	2x0,25	- Indicate the predominant chemical species taking into consideration pH of aqueous solution and pK_A of pair acid/base.
		3. Method ; $Q_{r,\text{eq}} = 1,58.10^{-5}$	0,75+0,25	-Give and exploit the expression of the reaction quotient Q_r through the reaction equation. -Calculate the value of the quotient of reaction Q_r of a chemical system in given state.
		4. No; Justification	2x0,25	- Know that the reaction quotient in equilibrium $Q_{r,\text{eq}}$, associated with the reaction equation of a chemical system, takes a value independent of concentrations, called equilibrium constant K.
	Part 2	1. $\text{CH}_3 - \text{COOH}(\text{aq}) + \text{HO}^-(\text{aq}) \rightarrow \text{CH}_3 - \text{COO}^-(\text{aq}) + \text{H}_2\text{O}(\ell)$	0,5	-Write the equation of titration reaction (use only one arrow)
		2. Get through : $C_A = 0,1 \text{ mol.L}^{-1}$ et $C_0 = 1 \text{ mol.L}^{-1}$	0,5 + 0,25	-Determine and exploit the point of equivalence.
		3. Verification of the value	0,75	

Part 3	1.	Functional groups : $-COOH$; $-OH$; $-COO-$	3x0,25	-Recognise in the formula of a chemical compound the organic functional groups: - $-OH$ (hydroxyl); $-CO_2H$ (carboxyl) ; $-CO_2R$ (ester); - $CO-O-CO-$ (acid anhydride).
	2.	Slow and limited (non-complete) transformation	0,25	-Know the characteristics of esterification and hydrolysis: non- complete and slow transformations.
	3.	Get through : $r = 66,7\%$	0,5	-Calculate the yield of a chemical transformation.
	4.	Expression of K ; $K = 4$	2x0,25	-Write and exploit the expression of the equilibrium constant K corresponding to the equations of the esterification and hydrolysis reactions.
	5.	Structural formula	0,5	-Write the equation of the reaction of an acid anhydride with an alcohol and that of the basic hydrolysis of an ester. -Know the characteristics of the reaction of an acid anhydride with an alcohol: fast and complete.

Physics (13 points)

Exercise	Question	Answer elements	Scale	Reference of the question in the Reference Framework
Exercise 1 (3 points)	1.	90 protons and 140 neutrons	2x0,25	-Know the meaning (significance) of the symbol ${}^A_Z X$ and give the corresponding composition of the nucleus.
	2.	Equation of disintegration ; type α	0,5 + 0,25	-Write the equation of a nuclear reaction by applying the two conservation laws. - Recognise the type of radioactivity using the equation of a nuclear reaction.
	3.	B	0,75	- Define and calculate the mass defect and the binding energy.
	4.1.	$\lambda = 2,8.10^{-6} \text{ year}^{-1}$	0,5	- Know and exploit the law of the radioactive decay, and exploit its curve.
	4.2.	Get through : $t_1 \approx 1,24.10^5 \text{ year}$	0,5	

Exercise	Question	Answer elements	Scale	Reference of the question in the Reference Framework
Exercise 2 (5 points)	1.1.	Establish the differential equation; $\tau = R_1 C$	0,5 0,25	- Find out the differential equation and verify its solution when the RC dipole is submitted to a step voltage.
	1.2.	$E = 12 \text{ V}$; $\tau \approx 38 \text{ ms}$	0,25+0,5	-Recognise and represent the variation curves of $u_C(t)$ between the capacitor terminals and different physical quantities associated to it, and exploit them. -Exploit experimental documents in order to: * recognise the observed voltages; * highlight the influence of R and C on the charging and the discharging processes; *determine the time-constant and charge duration; *determine the state type (transient or steady) and the time interval for each one.
	1.3.	Verify the value of C	0,25	- Know and exploit the time-constant expression.
	2.1.	Justify the nature of oscillations	0,5	- Recognise the undamped (periodic), the underdamped (pseudo-periodic) and the overdamped (non-periodic) states.
	2.2.	Method ; $Q_0 = 7,56.10^{-5} \text{ C}$	2x0,25	- Know and exploit the relationship $q = C.u$. -Recognise and represent the variation curves of the voltage between the capacitor terminals in terms of time for the three states mentioned above; and exploit them.
	2.3.	$T = 3 \text{ ms}$	0,25	- Exploit experimental documents in order to: * recognise the observed voltages; * recognise the damping states; * highlight the influence of R, L and C on the oscillation phenomenon; * determine the values of the period and the natural period.
	2.4.	Get through : $L=3,57.10^{-2} \text{ H}$	0,5	- Know and exploit the natural period expression.
	2.5.1.	\mathcal{E}_m : Curve 1 ; justification	2x0,25	- Know and exploit the energetic diagrams.

	2.5.2	Method ; $\Delta \mathcal{E} = -2,5 \cdot 10^{-4} \text{ J}$	1	- Know and exploit the expression of the electric energy stored in a capacitor. - Know and exploit the expression of the magnetic energy stored in an inductor. - Know and exploit the expression of the total energy in the circuit.
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Exercise	Question	Answer elements	Scale	Reference of the question in the Reference Framework
Exercise 3 (5points)	1.1.	Establish the differential equation	1	Apply Newton's second law to find out the differential equation of a system's centre of inertia motion in horizontal or inclined plane and determine the characteristics of kinetic and dynamic quantities of motion.
	1.2.	straight line (rectilinear) uniformly variable; justification	2x0,25	-Know and exploit the characteristics of the uniformly accelerated straight line motion and its parametric equations (t is the parameter).
	1.3.	Method ; $t_B \approx 9,16 \text{ s}$	2x0,25	
	1.4.	Method ; $v_B \approx 13,1 \text{ m.s}^{-1}$	2x0,25	
	1.5.	Method ; $R \approx 704,6 \text{ N}$	0,5+0,25	- Apply Newton's second law to find out the differential equation of a system's centre of inertia motion in horizontal or inclined plane and determine the characteristics of kinetic and dynamic quantities of motion.
	2.1.	Method	0,5	- Exploit a document representing the path (trajectory) of a projectile in a uniform gravitational field to: * determine the type of the motion (plane); * represent the velocity and the acceleration vectors; * determine the initial conditions and some parameters characterizing motion.
	2.2.	Yes ; $x_P \approx 9,85 \text{ m}$; $x_P > L$	0,25 0,25	
	2.3.	Method : $v_{Px} \approx 9,85 \text{ m.s}^{-1}$; $v_{Py} \approx -8,26 \text{ m.s}^{-1}$	0,5 0,25	