**Autoevaluation TEST Nº1** *(Topics 1-3)*

**Family name and name**_____

**Important**: Write your name before beginning the test. No additional material will be provided. Books, class notes are not allowed. Calculators are allowed. Use margins for drafts or calculus. **Mark with a cross the correct answer in the box at your left when you are completely sure. No crossings out and no additional comments are allowed. Correct answers mark as +1. Errors mark -0.1. Blanks mark as 0. The final score can not be less than 0**. There is only one correct answer in each question.

**1**.- Consider a nuclide of mass $m_X$ composed of N neutrons ($m_N$) and Z protons ($m_Z$). Which of the following statements is correct:

| | |
|---|---|
| | $m_X = m_N + m_Z$ |
| | $m_X < m_N + m_Z$ |
| | $m_X > m_N + m_Z$ |
| | $m_X - m_N - m_Z$ is the binding energy per nucleon |

**2**.- Which of the following statements is false:

| | |
|---|---|
| | Only three quantum numbers are needed to define the orbital of an electron ($n$, $l$, $m_l$). |
| | The energy of an electronic orbital is determined by only two quantum numbers ($n$, $l$). |
| | Magnetic quantum number, $m_l$, defines the shape and orientation of orbitals. |
| | Spin quantum number describes the electron magnetic field when it rotates about its own axis. |

**3**.- Write in decreasing order the radius of the following atoms and ions: K, $K^+$, Mg, Al, $Al^{3+}$.

| | |
|---|---|
| | $Al > Mg > K > K^+ > Al^{3+}$ |
| | $K > Mg > Al > K^+ > Al^{3+}$ |
| | $Al^{3+} > K^+ > Mg > K > Al$ |
| | $Al > K > Mg > K^+ > Al^{3+}$ |

**4**.- Which of the following compounds has more polar bonds and which is more polar? $CH_4$, $CCl_4$, $CF_4$, $CH_3Cl$

| | |
|---|---|
| | $CCl_4$: highest bond polarity and $CF_4$: highest polarity. |
| | $CH_3Cl$: highest bond polarity and $CCl_4$: highest polarity. |
| | $CF_4$: highest bond polarity and $CH_3Cl$: highest polarity. |
| | $CF_4$: highest bond polarity and $CF_4$: highest polarity. |

**5**.- Which of the following statements is false.

| | |
|---|---|
| | A Gy is the absorption of one joule of ionizing radiation by one kilogram of matter |
| | A Bq is the number of joules per second emitted by a radioactive nuclide |
| | A Ci is about $4 \cdot 10^{10}$ Bq |
| | An acceptable dose level is in the range of a rad |

**6**.-  Write the Lewis structure of ozone ($O_3$) ?

| | |
|---|---|
| | |
| | |
| | |
| | |


**7**.-  $SO_2$ and $H_2O$ molecules are both angular but bond angle in the former is 119º and 109 º in the later. Could you explain why?

| | |
|---|---|
| | Because sulfur has larger radius than oxygen |
| | Becaus of the hydrogen bonds in water molecule |
| | Because sulfur has only one lone pair of electrons while oxygen has two |
| | Because  oxygen has only one lone pair of electrons while sulfur has two |


**8**.-  Let us call x the axis that contains the two nucleus of a diatomic molecule. Which of the following is true?

| | |
|---|---|
| | The bonding MO formed by combination of two $p_Y$ has one nodal plane |
| | The antibonding MO formed by combination of two s has two nodal planes |
| | The bonding $\pi_X$ has one nodal plane |
| | The overlapping between two $p_X$ has cylindrical symmetry |


**9**.- Which of the following molecules presents the highest paramagnetism? $Li_2$, $B_2$, $N_2$, $Ne_2^+$

| | |
|---|---|
| | $Li_2$ |
| | $B_2$ |
| | $N_2$ |
| | $Ne_2^+$ |