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CHEMISTRY 101
EXAM 2 FORM B

Directions: (1) Put your name and signature on PART 2 of the exam where indicated.
(2) Sign the Aggie Code on PART 2 of this exam.
(3) Each multiple choice question is actually 2 questions on your scanning sheet. If you are sure of an answer, put the same answer down for both questions for 5 pts. If you cannot decide between two answers, put one answer down for one question and the other answer down for the other question. If you get one correct you'll get half credit for 2.5 pts. If there is an ambiguous multiple choice question, use the last page to explain your answer.
(4) Do NOT write on the envelope.
(5) When finished, put everything in the envelope and wait to be excused. At the table, take everything out of the envelope. You can pick up the multiple choice part with the answers outside my office after the exam.
(6) There are a total of 30 questions (18 actual questions).

## PART 1

1\&2. How many neutrons are in an atom of the isotope ${ }^{76} \mathrm{As}$ ?
(a) 33
(b) 43
(c) 11
(d) 1
(e) 0

3\&4. Which of the following is the correct name for $\mathrm{PI}_{3}$ ?
(a) phosphorus iodine
(b) monophosphorus iodide
(c) phosphorus(III) iodide
(d) phosphorus triiodide
(e) phosphorus tresiodine

5\&6. What is the oxidation number of carbon in the ion, $\mathrm{C}_{2} \mathrm{O}_{4}{ }^{2-}$ ?
(a) +2
(b) +3
(c) +4
(d) +6
(e) +8

7\&8. Which of the following is an insoluble base?
(a) RbOH
(b) $\mathrm{Ba}(\mathrm{OH})_{2}$
(c) LiOH
(d) $\mathrm{Mg}(\mathrm{OH})_{2}$
(e) KOH

9\&10. Which of the following atoms is diamagnetic in its ground state?
(a) K
(b) Sc
(c) Cr
(d) Ge
(e) Ca

11\&12. The total number of electrons that can be assigned to orbitals in the 3rd principle energy level where $n=3$ is $\qquad$ ?
(a) 12
(b) 6
(c) 3
(d) 9
(e) 18

13\&14. You are given the data for all the isotopes of the newly discovered element, Aggiedaddium:

| Abundance (\%) | Isotopic Mass (amu) |
| :---: | :---: |
| 10 | 122.00 |
| 50 | 125.00 |
| 40 | 128.00 |

The atomic weight of Aggiedaddium (in amu ) is:
(a) 125.9
(b) 125.0
(c) 125.6
(d) 124.7
(e) 126.0

15\&16. Which of the following statements is FALSE?
(a) If an electron has the quantum number $n=2$, the electron could be in $p$ energy sublevel.
(b) An electron that has $n=1$; it must be in an $s$ orbital.
(c) A possible set of quantum numbers for an electron in an atom is:

$$
n=2, \ell=-1, m_{\ell}=-1, \text { and } m_{s}=+1 / 2
$$

(d) If an electron has the quantum number $\ell=1$, it must be in a $p$ energy sublevel.
(e) Two electrons in the same atom cannot have quantum numbers of

$$
n=2, \ell=1, m_{\ell}=-1, \text { and } m_{\mathrm{s}}=-1 / 2 \quad \text { and } \quad n=2, \ell=1, m_{\bar{\ell}}-1, \text { and } m_{\mathrm{s}}=-1 / 2
$$

17\&18. After the 5 s subshell of an atom is filled, the next electron is located in the $\qquad$ subshell.
(a) $4 f$
(b) $5 p$
(c) 5 d
(d) 4 d
(e) $4 p$

19\&20. Which is an appropriate set of 4 quantum numbers for the last electron to go into an atom of iodine?

|  | n | $\ell$ | $\mathrm{m}_{\ell}$ | $\mathrm{m}_{\mathrm{S}}$ |
| :--- | :---: | :---: | :---: | :---: |
| (a) | 5 | 2 | 0 | $+1 / 2$ |
| (b) | 5 | 1 | -1 | $-1 / 2$ |
| (c) | 4 | 2 | 2 | $+1 / 2$ |
| (d) | 4 | 1 | -1 | $-1 / 2$ |
| (e) | 4 | 3 | -1 | $-1 / 2$ |

21\&22. Which of the following statements is/are TRUE given the following net ionic equation?

$$
\mathrm{HF}(\mathrm{aq})+\mathrm{OH}^{-}(\mathrm{aq}) \rightarrow \mathrm{F}^{-}(\mathrm{aq})+\mathrm{H}_{2} \mathrm{O}(\ell)
$$

(1) The base in this reaction is a weak electrolyte.
(2) HF is a weak acid.
(3) This could be the net ionic equation for HF reacting with $\mathrm{Cu}(\mathrm{OH})_{2}$.
(4) This reaction is classified as a precipitation reaction.
(5) The salt produced could be KF.
(6) The spectator ion could be $\mathrm{Mg}^{2+}$.
(a) all are correct
(b) none are correct
(c) 2, 5 only
(d) 2, 3, 5, 6 only
(e) 3, 5, 6 only

23\&24. A flask containing 615 mL of 0.400 M HBr was accidentally knocked to the floor. How many grams of $\mathrm{K}_{2} \mathrm{CO}_{3}$ would you need to put on the spill to neutralize the acid according to the equation:

$$
2 \mathrm{HBr}+\mathrm{K}_{2} \mathrm{CO}_{3} \rightarrow 2 \mathrm{KBr}+2 \mathrm{H}_{2} \mathrm{O} .
$$

(a) 17.0 g
(b) 8.00 g
(c) $15,400 \mathrm{~g}$
(d) $8,200 \mathrm{~g}$
(e) 2540 g

## CHEMISTRY 101 SPRING 2005 NAME

$\qquad$
EXAM 2 S 501-511
Form B
Signature

## PART 2

Please read and sign: "On my honor, as an Aggie, I have neither given nor received unauthorized aid on this exam."
(6 pts) 25. Sketch the following orbitals. Label the relevant axes.
(a) $p_{x}$ orbital
(b) $d_{y z}$ orbital
(5 pts) 26. Write out an acceptable ground state electronic configuration for the unknown element with atomic number 117. Use the correct noble gas to abbreviate the configuration.
(6 pts) 27. (a) Write the formula unit, total ionic and net ionic equations for the precipitation reaction between iron(II) nitrate and sodium sulfide. (Note: there will be deductions if you forget to put the correct phase and charges for all species for all equations.)
(4 pts) (b) Show all the major species present in the beaker before the reaction occurs and after the reaction is finished. You don't need to include water.


BEFORE


AFTER
28. Consider the reaction: $\mathrm{As}_{2} \mathrm{O}_{3}+5 \mathrm{H}_{2} \mathrm{O}+2 \mathrm{I}_{2} \rightarrow 2 \mathrm{H}_{3} \mathrm{AsO}_{4}+4 \mathrm{HI}$.
(2 pts) Which is the element being reduced? $\qquad$
(2 pts) The element changes in oxidation number from $\qquad$ to $\qquad$ .
(2 pts) The reducing agent is $\qquad$ .
(6 pts) 29. Write the formula unit, total ionic and net ionic equations for the neutralization reaction that would yield the salt, $\mathrm{Mg}\left(\mathrm{ClO}_{3}\right)_{2}$. (Note: there will be deductions if you forget to put the correct phase and charges for all species for all equations.)
(7 pts) 30. In class we had a demonstration of the emission lines of hydrogen. In this experiment, $3.02 \times 10^{-19} \mathrm{~J}$ of energy is released as red light when one electron falls from the $\mathrm{n}=3$ to the $\mathrm{n}=2$ principle energy level.

Calculate the wavelength of light emitted (in $\AA \AA$ ) when one excited electron went from the $\mathrm{n}=3$ energy level to the $\mathrm{n}=2$ energy level. $\left(1 \AA=1 \times 10^{-10} \mathrm{~m}\right)$


## SCRAP PAPER OR COMMENTS ON EXAM

| CHEMISTRY 101 | Spring 2005 | NAME___ |  |
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