

ANSWER SHEET (MC score 34 FR score 53(+) Total raw 155(+) total % _____)

$34 \times 3 = 102 + 53 = 155$

Part A. Write your answers to the following problems in the spaces provided.

1. Give the correct **chemical formula** for each of the following. [2 each]

- N₂O nitrous oxide Dany NO
- SiH₄ silicon tetrahydride
- CaSO₄ calcium sulfate
- Co₂(PO₄)₂ cobalt(II) phosphate
- Mg₃N₂ magnesium nitride
- CS₂ carbon disulfide

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2. Give a **correct systematic name** for each of the following. [2 each]

- phosphorus pentachloride PCl₅
- disulfur hexafluoride S₂F₆
- potassium nitrate KNO₃
- sodium sulfide Na₂S
- iron(II) carbonate FeCO₃
- ammonia NH₃

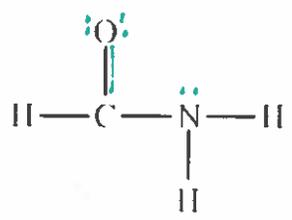
12

3. Give a **reasonable estimate**, with **appropriate metric unit**, for each of the following. [2 pts each]

- a. the mass of a grape: 8g 2g - 30g
- b. the length of your scantron card: 30 cm 10 cm - 70 cm
- c. the volume of a deck of playing cards: 150 mL 50 mL - 500 mL

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4. [6 pts] Add **lone pair electrons**, and/or turn **single bonds into double or triple bonds**, to complete the structure so that every atom has its normal electron arrangement. (You may not add new atoms to the molecule.)



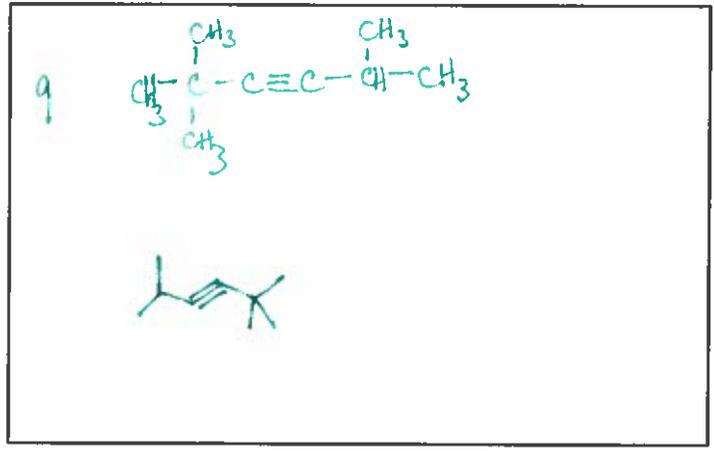
5. Fill in the blank for each of the following. [2 each]

- the name of the element Ag silver
- the symbol for the element lead Pb
- the abbreviation for milliliter mL
- the Period 4 noble gas Kr (Krypton)

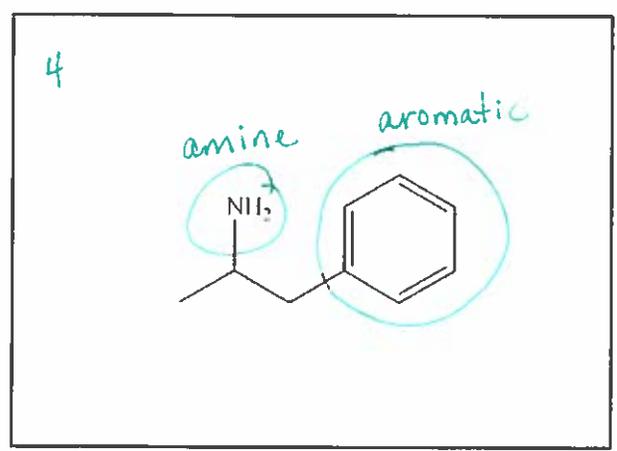
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6. [9 pts] In the box below, give the structure of **2,2,5-trimethyl-3-hexyne**.

(Line structure preferred. There is partial credit get as many parts of the molecule right as you can!)



7. [Bonus 4 pts] In the structure below, circle and clearly label the functional groups.



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Part B. Multiple Choice [3 points each]. Choose the **best** answer and mark the answer on the Scantron card.

1 Mark A on the Scantron card. (This item is a form identifier and will not be scored.)

The next few questions refer to the following five options. You may use each option once, more than once, or not at all.

A Ca

B Cl

C C

D Co

E Cu

- 2 Which of the elements is a main-group metal? A (Ca)
- 3 Which element has four valence electrons? C (C)
- 4 Which element forms a +2 ion and does not form ions of any other charge? A (Ca)
- 5 Which element is in Period 2? C (C)
- 6 Which element is an alkaline earth metal? A (Ca)
- 7 Which element could be X in the compound MgX_2 ? B (Cl)
- 8 Which element is copper? E (Cu)
- 9 Which element is a halogen? B (Cl)
- 10 Atoms of which element typically form 4 covalent bonds? C (C)
- 11 Atoms of which element commonly form anions in ionic compounds? B (Cl)

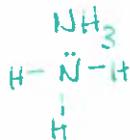
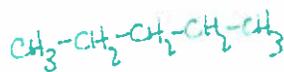
These questions refer to the following options. You may use each option once, more than once, or not at all. (Hint: draw structures or write formulas for the compounds, as appropriate!)

A ethyne

B pentane

C ammonia

D iron(II) oxide



- 12 Contains ionic bonds. D
- 13 A saturated hydrocarbon. B
no C=C or C≡C
- 14 Has a Lewis structure with one lone pair on one of the atoms. C
- 15 Contains a transition element. D
Fe
- 16 A molecular compound that is not organic. C
- 17 Contains a triple covalent bond. A

Part B. Multiple Choice (continued). Choose the best answer and record it in the appropriate space on the answer sheet.

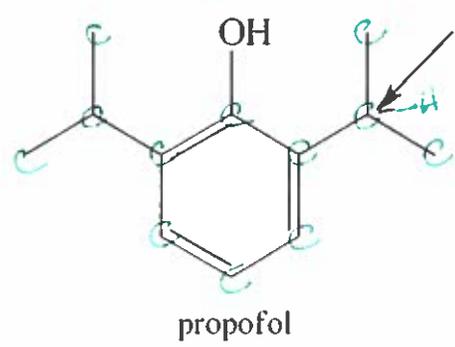
18 Elliot, the dog who lives next door to Dr. Hoyt, weighs 39 kg. What is his mass in g?
A 0.039 g B 39 g C 390 g D 3,900 g E 39,000 g

$39 \text{ kg} \times \frac{1000 \text{ g}}{\text{kg}} = 39,000 \text{ g}$

19 Which prefix stands for 1/100 of the base unit?
A μ B m C c D d E k

20 Which of the following substances is covalent/molecular?
A CuZn (2 metals alloy) B Na (element) C NaCl (ionic-metal+nonmetal) D HF (2 nonmetals) E more than one of these

\rightarrow 2+ nonmetals, no NH₄



The anesthetic that was ruled to have killed Michael Jackson (although, in addition, at least six other medical drugs were also found in his system) is propofol, shown at right.

21 One carbon atom in propofol is marked with an arrow. How many hydrogen atoms are attached to this carbon atom?
A 0 B 1 C 2 D 3 E 4

22 How many carbon atoms are in the molecular formula for propofol?
A 6 B 8 C 10 D 12 E 13

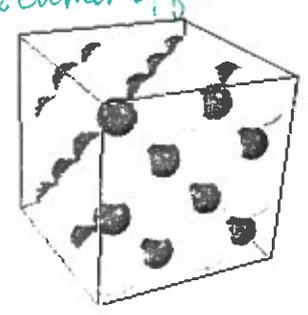
23 The most common mass number for atoms of the element Fe is 56, but there are other isotopes. What is the average mass of all atoms in a large sample of Fe?

A 26 B 30 C 55 D 55.85 E 56

24 What is the best classification for the sample shown at right?

A nonmetal element B metal element
C compound D homogeneous mixture
E heterogeneous mixture

2 elements, fixed ratio



25 Which of the following is a property of nonmetals?
A grouped in the right side of the periodic table
B malleable and shiny \times metals
C usually form cations in compounds \times metals
D combine with other nonmetals to form ionic compounds
E most are solid at room temperature \times lots of gases covalent

- 26 Which subatomic particle has mass = 1 amu and charge = 0?
 A proton **B neutron** C electron D more than one of these E none of these

charge	+1	0	-1
mass	1	1	0

The numbers in the chart describe a certain ion. Fill in the chart and use it to answer following questions.

Nuclear symbol	number of protons	number of neutrons	number of electrons	atomic number	mass number	charge
^{33}S	16	$33-16=17$	18 (charge=-2)	16	33	-2

- 27 How many neutrons are in the nucleus of this ion?
 A 14 B 16 **C 17** D 18 E 33
- 28 How many electrons does this ion have?
 A 2 B 14 C 16 **D 18** E 31
- 29 What element does this atom belong to?
 A He B Si **C S** D Ar E As
- 30 Which vocabulary word best applies to the ion in the chart?
 A polyatomic ion B cation **C anion** D scallion

- 31 What is the mass of 1.0 mole of sodium metal?
 A 22.99 amu B 23 amu C 1 g **D 22.99 g** E 6.02×10^{23} g
- average mass of 1 atom* *1 atom* *that would be H* *this is the # of atoms in a mole, not the mass of a mole*

The next several questions refer to these five substances:

- A ZnBr_2 B O_2 C H_2O D $\text{CH}_3\text{CH}_2\text{OH}$ E NH_4NO_3

- 32 Which substance is a **binary molecular compound**? **C**
2 elements both nonmetals
- 33 Which substance is a **diatomic element**? **B**
2 atoms of same element
- 34 Which formula represents an **organic compound**? **D**
both C & H present
- 35 Which substance includes ions with +2 charge? **A**

