

**Important Instructions:**

- 1) Use a soft (#2) graphite pencil only in filling out the answer sheet. **Make dark marks** in the correct circles on your answer sheet.
- 2) Print your name in the boxes on the upper left of Side 1 and blacken the respective circle under each letter of your name. Fill in **your last name first**.
- 3) Enter the first letter of the test color in the last box of the name grid and blacken the corresponding circle under the letter. **This is a White exam.**
- 4) You must enter a 10-digit identification code on your answer sheet as follows. The **left most digits** will be **117**, followed by the **7-digits of your NDSU NAID** number (the numbers before the dash). Next, blacken the respective circle under each digit of this identification code.
- 5) **Sign your name (do not print)** in the upper left hand corner of the answer sheet.
- 6) Answer each question by blackening the circle of the letter corresponding to the best or most correct answer to that question. **There is only one correct answer to each question.** If you blacken more than one circle for a question it will be scored as incorrect.
- 7) There should be **25 answers filled** in when you are finished.
- 8) Be prepared to **show a picture I. D.** when you turn in your quiz.

1. Which one of the following does *not* involve a chemical change?
  - a. a fish that is left for some time in an un-refrigerated place decomposes
  - b. apple juice which is left in an open bottle ferments
  - c. a loaf of bread rises and the gas produced expands the loaf when baked.
  - d. when a lake starts to freeze in winter, ice is formed on the surface
  - e. when sugar is fermented under certain conditions, alcohol is produced
2. The SI base units of temperature and mass, respectively, are
  - a. degree and gram
  - b. kelvin and kilogram
  - c. celsius and milligram
  - d. °K and kilogram
  - e. kelvin and gram
3. Iridium has a density of  $22.65 \text{ g cm}^{-3}$ . The vice president for research and development has an iridium figurine on his desk which weighs 11.50 pounds. What is its volume, in cubic inches?  
1 pound = 0.4536 kg, 1 inch = 2.54 cm exactly.
  - a. 5.533 cubic inches
  - b. 9.410 cubic inches
  - c. 14.05 cubic inches
  - d. 35.70 cubic inches
  - e. 90.67 cubic inches

4. The two major types of pure substances are
- compounds and elements
  - compounds and solutions
  - elements and mixtures
  - mixtures and solutions
  - solutions and elements
5. The symbol "Si" is used to represent the element:
- silver
  - silicon
  - sodium
  - sulfur
  - silicium
6. Which element below occurs in nature as a gas composed of diatomic molecules at ordinary temperatures and pressures?
- boron
  - silver
  - neon
  - nitrogen
  - sulfur
7. The naturally occurring, fictitious element, engrium, En, has the following composition.
- $^{147}\text{En}$ , 146.9672 a.m.u., 64.792%
- $^{149}\text{En}$ , 148.9638 a.m.u., 26.117%
- $^{150}\text{En}$ , 149.9592 a.m.u., 9.0910%
- What is the average atomic weight of naturally occurring engrium?
- 49.254
  - 147.76
  - 148.63
  - 148.67
  - 147.80
8. Which answer below best describes all atoms of a given isotope of a particular element?
- They possess the same mass, only.
  - They possess the same chemical properties and the same mass, but nothing else in common.
  - They possess the same atomic number and the same mass, but have nothing else in common.
  - They possess the same number of electrons, the same atomic number, the same mass, but nothing else in common.
  - They possess the same number of electrons, the same atomic number, the same mass, and the same chemical properties.
9. The fluoride anion,  $\text{F}^-$ , contains \_\_\_\_\_ electrons arranged around the nucleus.
- 8
  - 9
  - 10
  - 16
  - 18

10. The element set below that correctly features one alkali, one alkaline earth, one halogen, one lanthanide, and one actinide (in that order) is

- a. cesium, magnesium, bromine, erbium, plutonium
- b. titanium, beryllium, iodine, terbium, berkelium
- c. lithium, manganese, fluorine, lanthanum, vanadium
- d. potassium, radium, iodine, lutetium, platinum
- e. rubidium, strontium, chlorine, thorium, plutonium

11. Which of the sets below includes the largest number of elements?

- a. alkali metals
- b. alkaline earth elements
- c. halogens
- d. lanthanides
- e. noble gases

12. The atomic weight of boron is 10.811. What is the mass of a boron sample which contains 0.585 moles of B atoms?

- a. 0.00541 g
- b. 1.80 g
- c. 3.52 g
- d. 6.32 g
- e. 18.5 g

13. Which one of the following is a physical change?

- a. when ignited with a match in open air, paper burns
- b. in cold weather, water condenses on the inside surface of single pane windows
- c. when treated with bleach, some dyed fabrics change color
- d. when heated strongly, sugar turns dark brown
- e. grape juice left in an open unrefrigerated container turns sour

14. The boiling point of chlorine is  $-34.6\text{ }^{\circ}\text{C}$ . This temperature expressed in kelvins is

- a.  $-30.3\text{ K}$
- b.  $177.4\text{ K}$
- c.  $238.6\text{ K}$
- d.  $243.0\text{ K}$
- e.  $307.6\text{ K}$

15. Bromine is a red liquid at  $25^{\circ}\text{C}$ . Its density is  $3.12\text{ g/cm}^3$ . What is the volume of 28.1 g of liquid bromine?

- a.  $87.7\text{ cm}^3$
- b.  $0.111\text{ cm}^3$
- c.  $9.01\text{ cm}^3$
- d.  $28.1\text{ cm}^3$
- e. None of the above

16. The elements in a column of the periodic table are known as

- a. metalloids.
- b. a period.
- c. noble gases.
- d. a group.
- e. nonmetals.

In questions 17 – 21, correctly match the scientist with the discovery credited to them.

|               |                                 |
|---------------|---------------------------------|
| 17. Thomsen   | (a) Law of definite proportions |
| 18. Proust    | (b) Law of conservation of mass |
| 19. Mendeleev | (c) Atomic Theory               |
| 20. Lavoisier | (d) Organized elements in chart |
| 21. Dalton    | (e) Discovery of the electron   |

22. Many companies are selling throat lozenges and cough drops containing zinc gluconate or other zinc-containing compounds, claiming that they are a homeopathic remedy for the common cold and the flu?

What would be one of the first steps that you as a consumer would undertake to validate this claim, before shelling out a lot of money and taking a risk ingesting a metallic compound?

- a. hypothesize as to why zinc lozenges affect colds and flus
- b. formulate a theory based upon discussions with your friends
- c. go to the laboratory to study the effects of zinc on disease-causing bugs
- d. gather facts from sound scientific research articles as to zinc's homeopathic ability

23. The scientific revolution of the 1500s was marked by a move away from \_\_\_\_\_ and towards \_\_\_\_\_ as a method for explaining the natural world.

- a. law, theory
- b. alchemy, research
- c. reason, observation
- d. scientific theory, experimentation
- e. Both a and c are correct.

24. A substance composed of two or more different elements in fixed proportions is known as a(n) \_\_\_\_\_.

- a. atom
- b. element
- c. molecule
- d. ion
- e. compound

25. Solve the following equation for z.

$$2(z + 6) - 10 = 42$$

- a. 6
- b. 10
- c. 12
- d. 20
- e. 40

PERIODIC TABLE OF THE ELEMENTS

| 1           |             | 2           |             |             |              |              |              |              |              |              |              |              |              |              |              |              |              |  |     |    |     |      |       |
|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--|-----|----|-----|------|-------|
| IA          | IIA         |             |             |             |              |              |              |              |              |              |              |              |              |              |              | IIIA         |              |  | IVA | VA | VIA | VIIA | VIIIA |
| 1           | 2           | 3           | 4           | 5           | 6            | 7            | 8            | 9            | 10           | 11           | 12           | 13           | 14           | 15           | 16           | 17           | 18           |  |     |    |     |      |       |
| H<br>1.008  | He<br>4.003 | Li<br>6.941 | Be<br>9.012 | B<br>10.81  | C<br>12.01   | N<br>14.01   | O<br>16.00   | F<br>19.00   | Ne<br>20.18  | Na<br>22.99  | Mg<br>24.31  | Al<br>26.98  | Si<br>28.09  | P<br>30.97   | S<br>32.07   | Cl<br>35.45  | Ar<br>39.95  |  |     |    |     |      |       |
| K<br>39.10  | Ca<br>40.08 | Sc<br>44.96 | Ti<br>47.88 | V<br>50.94  | Cr<br>52.00  | Mn<br>54.94  | Fe<br>55.85  | Co<br>58.93  | Ni<br>58.69  | Cu<br>63.55  | Zn<br>65.39  | Ga<br>69.72  | Ge<br>72.59  | As<br>74.92  | Se<br>78.96  | Br<br>79.90  | Kr<br>83.80  |  |     |    |     |      |       |
| Rb<br>85.47 | Sr<br>87.62 | Y<br>88.91  | Zr<br>91.22 | Nb<br>92.91 | Mo<br>95.94  | Tc<br>98.91  | Ru<br>101.1  | Rh<br>102.9  | Pd<br>106.4  | Ag<br>107.9  | Cd<br>112.4  | In<br>114.8  | Sn<br>118.7  | Sb<br>121.8  | Te<br>127.6  | I<br>126.9   | Xe<br>131.3  |  |     |    |     |      |       |
| Cs<br>132.9 | Ba<br>137.3 | La<br>138.9 | Hf<br>178.5 | Ta<br>180.9 | Hg<br>183.9  | Ra<br>186.2  | Os<br>190.2  | Ir<br>192.2  | Pt<br>195.1  | Au<br>197.0  | Hg<br>200.6  | Tl<br>204.4  | Pb<br>207.2  | Bi<br>209.0  | Po<br>210    | At<br>210    | Rn<br>222    |  |     |    |     |      |       |
| Fr<br>223   | Ra<br>226   | Ac<br>(227) | Th<br>(227) | Pa<br>(231) | U<br>(238.0) | Uup<br>(262) | Uub<br>(263) | Uuq<br>(264) | Uur<br>(265) | Uus<br>(266) | Uuq<br>(267) | Uur<br>(268) | Uus<br>(269) | Uuq<br>(270) | Uur<br>(271) | Uus<br>(272) | Uuq<br>(273) |  |     |    |     |      |       |