Answer the following questions by marking the **BEST** answer on the answer sheet.

1. How many significant figures does the number 0.002014900 have?
   a. 7  b. 9  c. 5  d. 10

2. Several groups of students from Texas High were hired by Polymer Company, Inc. to mass 33.0 g of a sample of polypropylene. Their data is listed below.

<table>
<thead>
<tr>
<th>Group A:</th>
<th>35.2 g</th>
<th>35.3 g</th>
<th>35.3 g</th>
<th>35.2 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group B:</td>
<td>33.5 g</td>
<td>33.5 g</td>
<td>33.4 g</td>
<td>33.5 g</td>
</tr>
<tr>
<td>Group C:</td>
<td>40.5 g</td>
<td>53.5 g</td>
<td>35.3 g</td>
<td>30.2 g</td>
</tr>
</tbody>
</table>

Which group of students had good Precision and poor Accuracy?
   a. Group A  b. Group B  c. Group C

3. Convert $20^\circ F$ to Kelvin
   a. 280 K  b. 266 K  c. 302 K  d. 251 K

4. Which properties are characteristic of elements classified as nonmetals?
   a. shiny appearance  b. brittle  c. malleable  d. both a and c

5. A Texas High student took a beaker containing a colorless liquid and evaporated the liquid. After the liquid was evaporated, she observed a white residue in the beaker. From these observations, she would conclude that the original liquid was
   a. compound.  b. element.  c. mixture.  d. pure substance.

6. Stability is a characteristic of
   a. a SOLUTION.  b. a COLLOID.  c. a SUSPENSION.  d. BOTH a and b
   e. BOTH b and c

7. Food digesting in the stomach is an example of a
   a. chemical property.  b. chemical change.  c. physical property.  d. physical change.

8. A measurement of how tightly packed the particles in a substance are is
   a. weight.  b. mass.  c. volume.  d. density.

9. The insoluble product of a reaction that falls to the bottom of container is the
   a. precipitate.  b. filtrate.  c. extraction.  d. residue.

10. Which of the following is true about the isotope $^{28}_{13}$Al?
    a. 13 neutrons  b. 13 electrons  c. atomic mass of 27  d. 15 protons

11. Which is true about the compound HgCl$_2$?
    a. It is a binary compound.  b. It contains 2 nonmetals.  c. It contains a polyvalent ion.  d. BOTH a and c

12. Which of the following is the name of the compound with the formula Ni$_2$(SO$_4$)$_3$?

13. Which of the following is the formula for the compound calcium carbonate?
    a. Ca$_2$C  b. Ca(HCO$_3$)$_2$  c. Ca(CO$_3$)$_2$  d. CaCO$_3$
14. Which of the following is the formula for the compound Mercury (II) phosphate?  
   a. $\text{Mg}_3(\text{PO}_4)_2$  
   b. $\text{Mg}_2(\text{PO}_4)_3$  
   c. $\text{Hg}_2(\text{PO}_4)_2$  
   d. $\text{Hg}_2(\text{PO}_4)_3$

15. As the temperature of a gas decreases, the energy of the gas molecules 
   a. increases.  
   b. decreases.  
   c. remains the same.

16. Which temperature is the highest?  
   a. 100°C  
   b. 100 K  
   c. 0°C  
   d. 0 K

17. Which of the following is correct about STP?  
   a. standard time and pressure is midnight and 1 atm  
   b. standard temperature and pressure is 0 K and 1 atm  
   c. standard time and proportion is noon and 1 mol  
   d. standard temperature and pressure is 0°C and 1 atm

18. What is the molar mass of $(\text{NH}_4)_2\text{CO}_3$?  
   a. 96 g/mol  
   b. 46 g/mol  
   c. 64 g/mol  
   d. 82 g/mol

19. All of the following are pressure units EXCEPT  
   a. atmosphere.  
   b. pascal.  
   c. STP.  
   d. kPa.

20. Convert 935 mm Hg to atmospheres.  
   a. 935 atm  
   b. 7.11 atm  
   c. 1.23 atm  
   d. 0.813 atm

21. The molar mass of $\text{Ca}_3(\text{PO}_4)_2$ is closest to  
   a. 310 g.  
   b. 246 g.  
   c. 167 g.  
   d. 87 g.

22. Which of the following describes one mole of iron?  
   a. $6.02 \times 10^{23}$ atoms  
   b. 55.8 g Fe  
   c. both a and b  
   d. neither a or b

23. If the total gas pressure is 99.2 kPa and the water vapor pressure is 2.6 kPa, what is the partial pressure of the nitrogen gas that is mixed with the water vapor?  
   a. 38.1 kPa  
   b. 96.6 atm  
   c. 101.8 kPa  
   d. 96.6 kPa

24. Which of the following contains the same number of atoms:  
   a. 12.0 g C and $6.02 \times 10^{23}$ atoms  
   b. 16.0 g O$_2$ and 2.00 moles of oxygen  
   c. 1.00 mole carbon and 6.0 g C  
   d. 1.00 mole neon and 1.00 atom Ne

25. How many moles are in 93.9 g of carbon?  
   a. $1.56 \times 10^{-22}$  
   b. 7.83  
   c. 1127  
   d. $5.65 \times 10^{25}$

26. Calculate the number of atoms of Zn in 3.0 moles.  
   a. 196.2  
   b. 0.0459  
   c. $1.81 \times 10^{24}$  
   d. $4.98 \times 10^{24}$

27. How many grams are in 5.08 moles of Ca(NO$_3$)$_2$?  
   a. 752.12 g  
   b. 833.12 g  
   c. $3.06 \times 10^{24}$ g  
   d. 0.03 g

28. In a chemical equation, the symbol used for a solution is  
   a. (g).  
   b. (s).  
   c. (aq).  
   d. (sol).
For questions 29 – 30 use the solubility graph below.

29. According to the solubility graph, at 30°C, which of the following compounds is the most soluble in 100 grams of water?
   a. NaCl  
   b. Yb₂(SO₄)₃  
   c. KNO₃  
   d. NaNO₃

30. According to the graph, 110 grams of KNO₃ dissolves at what temperature?
   a. 30°C  
   b. 40°C  
   c. 60°C  
   d. 70°C

31. Which has the highest percentage of oxygen?
   a. NaHCO₃  
   b. (NH₄)₂SO₄  
   c. Na₂S₂O₃  
   d. H₂O₂

32. Arrange the following in order of increasing mass:
   w. 1 molecule of I₂  
   x. 4.0 x 10²³ molecules of C₄H₁₀  
   y. 6.02 x 10²³ molecules of CO  
   z. 1 mole of P₂O₅

   a. w, y, x, z  
   b. y, w, z, x  
   c. z, x, y, w  
   d. x, y, w, z

33. The concentration of a solution in moles of solute per liter of solution is called:
   a. molar mass  
   b. molarity  
   c. volume mass  
   d. parts per million
34. The molarity of a solution in which 15.5 g NaOH is dissolved in 0.100 L of solution is ________?
   a. 620 M  b. 3.88 M  c. 2.58 M  d. 0.155 M

35. How many grams of ZnCl$_2$ are needed to make 25.0 mL of 0.105 M ZnCl$_2$ solution?
   a. 0.24 g  b. 0.36 g  c. 2.6 g  d. 4.2 g

36. What is the percent composition of sulfur by mass in this sample: 64 g S and 152 g Na?
   a. 29.6%  b. 42.1%  c. 0.296%  d. 70.3%

37. What is the percent composition of hydrogen by mass in C$_3$H$_8$?
   a. 18.2%  b. 82%  c. 50.0%  d. 72.0%

38. Which of the following sets of coefficients are needed to balance the equation: ___Li + ___Br$_2$ $\rightarrow$ ___LiBr
   a. 1,1,2  b. 2,0,2  c. 1,2,4  d. 2,1,2

39. Sodium tetraborate, Na$_2$B$_4$O$_7$, is produced according to the unbalanced equation:
   \[ \text{H}_3\text{BO}_3 + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{Na}_2\text{B}_4\text{O}_7 \]
   How many grams of Boric acid, H$_3$BO$_3$, are needed to make 150,000 grams of Na$_2$B$_4$O$_7$?
   a. 47.91 grams  b. 5.39 x 10$^{-3}$  c. 50096 grams  d. 184157.36 grams

40. Magnesium can be reacted with Iodine to form magnesium iodide. How many grams of magnesium iodide can be formed from 8.06 grams magnesium and 63.46 grams iodine?
   a. 75.5 grams  b. 8.16 grams  c. 51.34 grams  d. 102.68 grams

END OF TEST
Answer Key

1. A
2. A
3. B
4. B
5. C
6. D
7. B
8. D
9. A
10. B
11. D
12. D
13. D
14. C
15. B
16. A
17. D
18. A
19. C
20. C
21. A
22. C
23. D
24. A
25. B
26. C
27. B
28. C
29. D
30. C
31. D
32. C
33. B
34. B
35. B
36. A
37. A
38. D
39. D
40. C