STAAR

State of Texas
Assessments of
Academic Readiness

Chemistry

2011 Released Test Questions

These released questions represent selected TEKS student expectations for each reporting category. These questions are samples only and do not represent all the student expectations eligible for assessment.

1 A chemistry student's investigation is described below.

> 1. The student obtains 15 g of an unknown substance.
> 2. The student notes that at room temperature the substance is a solid and is colored white.
> 3. The student determines that the density of the substance is 2.17 g/cm^3.
> 4. The student then determines that the substance is soluble in water.

The student determines that the unknown substance is sodium chloride. Which of the following is an extensive property of sodium chloride?

A Mass of 15 g

B White color

C Density of 2.17 g/cm^3

D Solubility in water

2 Which of the following elements has the smallest atomic radius?

A Sulfur

B Chlorine

C Aluminum

D Sodium

3   Based on his observations, the English chemist John Dalton formulated an atomic theory.

Dalton's Atomic Theory
1. All elements are made up of tiny indivisible particles called atoms.
2. Atoms of the same element are identical. The atoms of one element are different from the atoms of another element.
3. Atoms of different elements chemically combine to form chemical compounds.
4. During chemical reactions, atoms are rearranged. Atoms of one element cannot be changed into atoms of a different element as a result of a chemical change.

In 1897, J. J. Thomson showed that negative charges could be made to move from one end of a cathode ray tube to another, causing the tube to glow. Because of this, Thomson is credited with the discovery of the electron. Based on this information, which part of Dalton's atomic theory conflicted with Thomson's new data?

A 1

B 2

C 3

D 4

4   Some properties of scandium are determined by the electron arrangement within scandium atoms. What is the ground state electron configuration of scandium?

A $[Ar]4s^2 3p^1$

B $[Ar]4s^2 3d^1$

C $[Ar]4s^2 4p^1$

D $[Ar]4s^2 4d^1$

5   Element X has two known naturally occurring isotopes. The mass and relative abundance of each isotope are shown below.

| Relative Abundance	Mass (amu)
50.57%	78.92
49.43%	80.92

What is the average atomic mass of Element X to the nearest hundredth of an atomic mass unit?

Record your answer and fill in the bubbles on your answer document.

6   Carbon dioxide is a compound that forms with the combustion of carbon in the presence of oxygen. Electron-dot formulas are used to model the bonds that form. Which of these is the electron-dot formula for carbon dioxide?

A   :Ö:C:Ö:

B   :Ö::C::Ö:

C   :Ö:C̈:Ö:

D   :O::C̈::O:
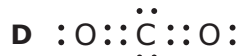
7 Some students burned magnesium in excess oxygen, as described by the equation

$$2Mg(s) + O_2(g) \xrightarrow{\Delta} 2MgO(s).$$
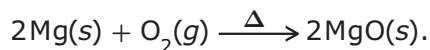
They recorded their data in the table below.

Mass of Crucible	35.84 g
Mass of Crucible + Mg	38.35 g
Mass of Mg	?
Mass of Crucible + MgO	39.45 g
Mass of MgO	?

What is the percentage yield of MgO in this reaction?

A 97.2%

B 86.8%

C 58.0%

D 51.0%

8

$$\underline{\qquad} + 4HCl(aq) \rightarrow PbCl_2(s) + Cl_2(g) + 2H_2O(l)$$

The partial chemical equation above represents the formation of lead(II) chloride. What is the missing reactant?

**A** PbO(s)

B Pb(s)

C PbO_2(s)

D PbCl_4(s)

9 A gas was held at a constant temperature in a closed system. The initial pressure of the gas was 1.20 atm, while its initial volume was 2.30 L. The final volume of the gas was 1.50 L. What was the final pressure of the gas to the nearest hundredth of an atmosphere?

Record your answer and fill in the bubbles on your answer document.
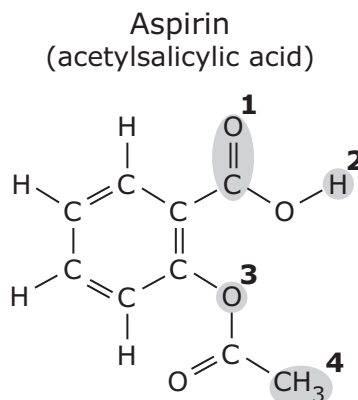
10 Which enthalpy diagram shows that the reaction

$$A_2(g) + X_2(g) \rightarrow 2AX(g)$$
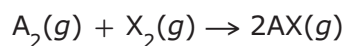
is an exothermic reaction that produces 550 kJ of heat?

A

C

B

D
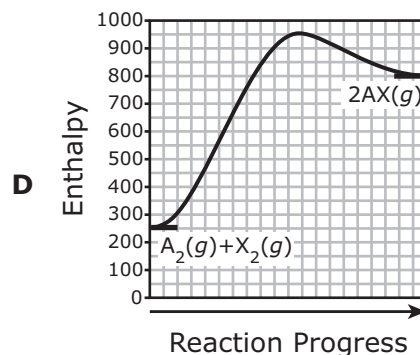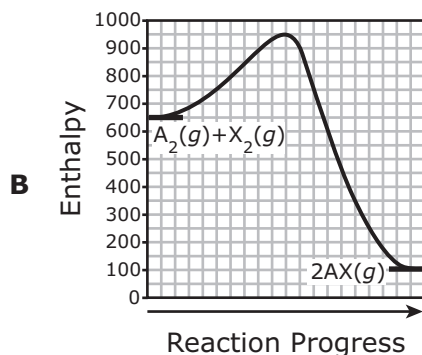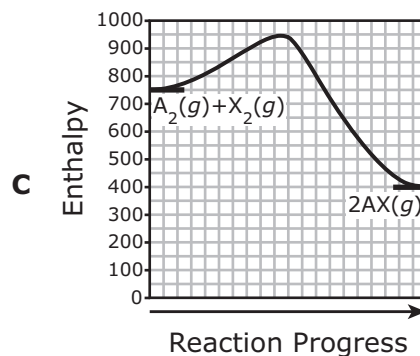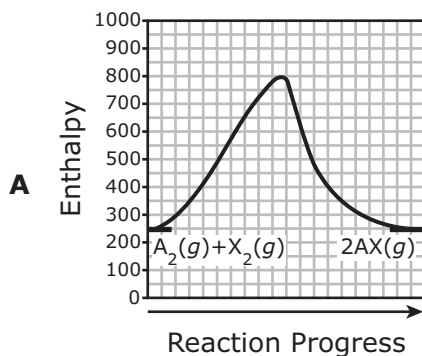
11 The diagram below shows the structure of a common pain reliever.

Aspirin
(acetylsalicylic acid)

Which of the highlighted atoms or group of atoms makes aspirin a Brønsted-Lowry acid?

A 1

B 2

C 3

D 4

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12 Which of the following chemical reactions will produce a precipitate?

A $3KBr + AlPO_4 \rightarrow K_3PO_4 + AlBr_3$

B $ZnCl_2 + Mg_2SO_4 \rightarrow ZnSO_4 + MgCl_2$

C $Na_2CO_3 + CaCl_2 \rightarrow CaCO_3 + 2NaCl$

D $NH_4OH + KCl \rightarrow KOH + NH_4Cl$

Item Number	Reporting Category	Readiness or Supporting	Content Student Expectation	Process Student Expectation	Correct Answer
1	1	Supporting	C.4(B)	C.2(E)	A
2	1	Readiness	C.5(C)		B
3	2	Supporting	C.6(A)	C.3(F)	A
4	2	Readiness	C.6(E)		B
5	2	Supporting	C.6(D)	C.2(G)	79.91
6	3	Readiness	C.7(C)		B
7	3	Supporting	C.8(E)	C.2(G)	B
8	3	Readiness	C.8(D)		C
9	4	Readiness	C.9(A)	C.2(H)	1.84
10	4	Readiness	C.11(C)	C.2(H)	B
11	5	Supporting	C.10(G)		B
12	5	Readiness	C.10(H)		C

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