

CHEMISTRY

1. CHEMISTRY

Writer: American Heritage

Toss Up: Short Answer

What type of hybridization occurs in the molecule sulfur hexafluoride?

Bonus Answer: $d^2 sp^3$

Bonus: Multiple Choice

Which of the following best describes a bonding molecular orbital

W) A molecular orbital lower in energy than the atomic orbitals of which it is composed

X) A molecular orbital higher in energy than the atomic orbitals of which it is composed

Y) A molecular orbital equal in energy to the atomic orbitals of which it is composed

Z) A molecular orbital with exactly twice the energy of the atomic orbitals of which it is composed

Bonus Answer: W

2. CHEMISTRY

Writer: American Heritage

Toss Up: Multiple Choice

Which of the following compounds is soluble in water at room temperature?

W) $AgSO_4$

X) CaS

Y) $CaSO_4$

Z) PbF_2

Toss Up Answer: X

Bonus: Short Answer

A solution is prepared with an unknown solvent, and $NaNO_3$. 4L of the solvent are mixed with 42 moles of $NaNO_3$ to produce a 7 molar solution. Find the density of the solvent in grams per centimeter cubed.

Bonus Answer: 1.5 g/cm^3

3. CHEMISTRY

Writer: American Heritage

Toss Up: Multiple Choice

Which of the following elements has the highest first ionization energy?

W) Boron

X) Nitrogen

Y) Carbon

Z) Oxygen

Toss Up Answer: X

Bonus: Multiple Choice

Livermorium (element 116) was synthesized by bombarding curium (element 96) with what other element?

W) Neon

X) Argon

Y) Titanium

Z) Calcium

Bonus Answer: Z

4. CHEMISTRY

Writer: Stuyvesant

Toss Up: Multiple Choice

What form of hybridization is found in Sulfur Hexafluoride?

- W) sp^3
- X) sp^3d^2
- Y) sp^3d^3
- Z) sp^4d^3

Toss Up Answer: X

Bonus: Multiple Choice

Which of the following amino acids is aromatic?

- W) Tryptophan
- X) Glutamic Acid
- Y) Methionine
- Z) Lysene

Bonus Answer: W

5. CHEMISTRY

Writer: Stuyvesant

Toss Up: Multiple Choice

Which of the following is the ionic charge of the Dimercury ion?

- W) $1+$
- X) 0
- Y) $2+$
- Z) $1-$

Toss Up Answer: Y

Bonus: Short Answer

What is the electron configuration of Iron(III)? Include its full electron configuration.

Bonus Answer: $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$

6. CHEMISTRY

Writer: Stuyvesant

Toss Up: Short Answer

What is the name of the elements in Group 16?

Bonus Answer: Chalcogens (Accept: Chalcogen, Oxygen Family)

Bonus: Short Answer

When Carbonic acid is created what does it always decompose into?

Bonus Answer: Dihydrogen Monoxide and Carbon Dioxide (Accept: H_2O and CO_2 , Water and CO_2)

7. CHEMISTRY

Writer: Centennial

Toss Up: Short Answer

What is the most significant component in duralumin, other than aluminum?

Bonus Answer: Copper

Bonus: Short Answer

The addition of copper makes the alloy susceptible to which process, from which pure aluminum is usually protected?

Bonus Answer: Corrosion

8. CHEMISTRY

Writer: Centennial

Toss Up: Short Answer

63/37 leaded solder is this type of mixture, which melts at once instead of melting as components.

Bonus Answer: Eutectic

Bonus: Short Answer

Apart from tin whiskers, lead-free solder also suffers from this problem at low temperatures.

Bonus Answer: Tin pest

9. CHEMISTRY

Writer: Granada Hills

Toss Up: Multiple Choice

What is the name of the group of the periodic table that includes selenium?

- W) Halogens
- X) Noble gases
- Y) Alkali metals
- Z) Chalcogens

Toss Up Answer: Z

Bonus: Short Answer

What is the general name of the compounds that are highly toxic and are formed from reacting ammonia with baking soda?

Bonus Answer: Chloramines

10. CHEMISTRY

Writer: Granada Hills

Toss Up: Short Answer

Helium has a molar mass of 4 grams per mole and effuses at a rate of 10 moles per minute. If you have an unknown gas with a molar mass of 16 grams per mole, How many moles per minute would it effuse at?

Bonus Answer: 5

Bonus: Short Answer

By name or number, indicate all of the following choices that would undergo SN1.

- I. 2-bromo-2-methylpropane
- II. $\text{CH}_3\text{CHCHCH}_2\text{Cl}$
- III. Polyethylene

Bonus Answer: I only

11. CHEMISTRY

Writer: Granada Hills

Toss Up: Short Answer

What element has one electron in the 4f subshell?

Bonus Answer: Lanthanum

Bonus: Multiple Choice

The compound NbCl_5 would have which of the following shapes?

- W) octahedral
- X) seesaw
- Y) square planar
- Z) trigonal bipyramidal

Bonus Answer: W

12. CHEMISTRY

Writer: Centennial

Toss Up: Short Answer

How many alkenes have the formula of C_4H_8 ?

Bonus Answer: four

Bonus: Short Answer

Rank the following elements in increasing order of melting point: vanadium, iron, cobalt, tantalum

Bonus Answer: cobalt, iron, vanadium, tantalum

13. CHEMISTRY

Writer: Brooklyn Tech

Toss Up: Short Answer

What type of energy release allows the formation of ionic bonds to be an exothermic process?

Bonus Answer: lattice energy

Bonus: Short Answer

How many electrons fill the f orbital?

Bonus Answer: 14

14. CHEMISTRY

Writer: Brooklyn Tech

Toss Up: Multiple Choice

Which of the following two compounds will react in an aqueous solution to form a precipitate?

- W) Ammonium Nitrate and Sodium Chloride
- X) Potassium Hydroxide and Calcium Acetate
- Y) Magnesium Bromide and Sodium Chromate
- Z) Lead Chlorate and Potassium Sulfide

Toss Up Answer: Z

Bonus: Short Answer

Which isotope of Uranium is fissile?

Bonus Answer: Uranium-235

=====