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Chemistry\_Questions\_0081

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**1. (ch05)**

Calculate the standard enthalpy of formation of  $\text{CaCO}_3(s)$  given



and the following information:

Compound	$\Delta_f H^\circ (\text{kJ mol}^{-1})$
$\text{CO}_2(g)$	-393.5
$\text{CaO}(s)$	-635.5

**Student Response**

1. -851 kJ
2. +1207 kJ
3. -1207 kJ
4. +851 kJ
5. -420 kJ

**2. (ch05)**

A 22.9-g sample of liquid hexane (specific heat =  $2.27 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$ ), initially at  $11.7^\circ\text{C}$ , is heated until its final temperature is  $35.7^\circ\text{C}$ . How much heat was added to the sample?

**Student Response**

1. 0.0240 kJ
2. 1.25 kJ
3. 2.27 kJ
4. 0.0545 kJ
5. 0.550 kJ

**3. (ch05)**

A 15.0-g sample of aluminum (specific heat =  $0.902 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$ ), initially at  $95.0^\circ\text{C}$ , is immersed in a 35.0-g sample of water (specific heat =  $4.184 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$ ), initially at  $44.2^\circ\text{C}$ , in an insulated container. Once equilibrium is reached, what is the final temperature of the metal-water mixture?

**Student Response**

1.  $69.6^\circ\text{C}$
2.  $28.3^\circ\text{C}$
3.  $39.7^\circ\text{C}$

4. 48.0°C

5. 49.6°C

**4. (ch05)**

Consider the following processes used to produce energy. Which does *not* predominantly use potential energy?

**Student Response**

1. Burning natural gas
2. Fossil fuel plant
3. Nuclear power plant
4. Hydroelectric power plant
5. Windmills on wind farms

**5. (ch05)**

A gas expands from 1.12 L to 5.53 L against a constant external pressure of 8.33 atm. What is the value of  $w$ ? (1 L atm = 101.3 J)

**Student Response**

1.  $-4.47 \times 10^2$  J
2. -36.7 J
3. 36.7 J
4.  $3.72 \times 10^3$  J
5.  $-3.72 \times 10^3$  J

**6. (ch05)**

Calculate  $\Delta U$  of a gas for a process in which the gas absorbs 18 J of heat and does 6 J of work by expanding.

**Student Response**

1. -12 J
2. +12 J
3. -24 J
4. +24 J
5. None of the above

**7. (ch01)**

Convert 60.7 km to mm.

**Student Response**

1.  $6.07 \times 10^{10}$  mm
2.  $6.07 \times 10^{-5}$  mm
3.  $6.07 \times 10^7$  mm
4.  $6.07 \times 10^4$  mm

5.  $6.07 \times 10^{-2}$  mm

**8. (ch01)**

Convert  $47.4 \text{ m}^3$  to  $\text{pm}^3$ .

**Student Response**

1.  $4.74 \times 10^{-35} \text{ pm}^3$
2.  $4.74 \times 10^{13} \text{ pm}^3$
3.  $4.74 \times 10^{37} \text{ pm}^3$
4.  $4.74 \times 10^{-23} \text{ pm}^3$
5.  $4.74 \times 10^{25} \text{ pm}^3$

**9. (ch01)**

Convert 17.0 lb to pg. (1 lb = 453.6 g)

**Student Response**

1.  $7.71 \times 10^{15} \text{ pg}$
2.  $3.75 \times 10^{10} \text{ pg}$
3.  $7.71 \times 10^3 \text{ pg}$
4.  $7.71 \times 10^{-9} \text{ pg}$
5.  $3.75 \times 10^{-2} \text{ pg}$

**10. (ch01)**

A certain substance makes up  $2.2 \times 10^{-4}$  percent by mass of a normal healthy human being. How many grams of that substance would be found in the body of a person weighing 140 lb? (1.0 kg = 2.2 lb.)

**Student Response**

1. 310 g
2. 0.14 g
3. 1.4 g
4. 140 g
5. 0.7 g

**11. (ch01)**

A sample of milk is found to have arsenic at a concentration of  $3.18 \text{ } \mu\text{g/L}$ . What is the concentration in ounces per gallon?

1 qt = 946.4 mL

1 gal = 4 qt

16 oz = 1 lb

1 kg = 2.2 lb

**Student Response**

1.  $4.24 \times 10^{-7} \text{ oz/gal}$

2.  $3.42 \times 10^{-4}$  oz/gal
3.  $2.96 \times 10^{-8}$  oz/gal
4. 2.19 oz/gal
5.  $2.39 \times 10^3$  oz/gal

**12. (ch01)**

A piece of metal (mass = 18.688 g) is placed in 11.95 mL of chloroform (d = 1.498 g/mL) in a 25 mL graduated cylinder. The chloroform level increases to 15.46 mL. The best value for density of this metal from these data is

**Student Response**

1. 1.209 g/mL.
2. 3.55 g/mL.
3. 7.98 g/mL.
4. 5.32 g/mL.
5. 5.324 g/mL.

**13. (ch03)**

All of the following equations are balanced *except*

**Student Response**

1.  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7 \longrightarrow \text{N}_2\text{O} + \text{Cr}_2\text{O}_3 + 4\text{H}_2\text{O}$ .
2.  $\text{NH}_4\text{NO}_3 \longrightarrow \text{N}_2\text{O} + 2\text{H}_2\text{O}$ .
3.  $\text{C}_{12}\text{H}_{22}\text{O}_{11} \longrightarrow 12\text{C} + 11\text{H}_2\text{O}$ .
4.  $2\text{NH}_4\text{SCN} + \text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O} \longrightarrow 2\text{NH}_3 + 10\text{H}_2\text{O} + \text{Ba}(\text{SCN})_2$ .
5.  $2\text{Mg} + \text{CO}_2 \longrightarrow 2\text{MgO} + \text{C}$ .

**14. (ch03)**

A compound composed of only C and F contains 17.39% C by mass. What is its empirical formula?

**Student Response**

1. CF
2. C<sub>2</sub>F
3. CF<sub>4</sub>
4. CF<sub>3</sub>
5. CF<sub>2</sub>

**15. (ch03)**

A crystal of the mineral troegerite,  $(\text{UO}_2)_3(\text{AsO}_4)_2 \cdot 12\text{H}_2\text{O}$  (FW = 1304), contains \_\_\_\_\_ % uranium by mass.

**Student Response**

1. 42.0
2. 18.0
3. 33.0
4. 58.9
5. 54.8

**16. (ch03)**

A mole of a compound is composed of  $3.01 \times 10^{23}$  atoms of sodium, 17.72 g of chlorine atoms, and 24.00 g of oxygen atoms. The formula of the compound is

**Student Response**

1.  $\text{NaClO}_2$ .
2.  $\text{NaClO}_4$ .
3.  $\text{NaClO}$ .
4.  $\text{NaClO}_3$ .
5. none of the above.

**17. (ch03)**

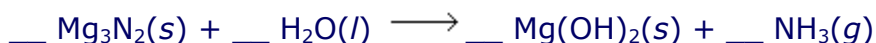
A 1.1 g sample of washing soda,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , has  $2.3 \times 10^{21}$  carbon atoms. How many oxygen atoms are present in 1.1 g of washing soda?

**Student Response**

1.  $2.5 \times 10^{21}$
2.  $3.0 \times 10^{22}$
3.  $2.3 \times 10^{21}$
4.  $2.3 \times 10^{22}$
5.  $6.9 \times 10^{21}$

**18. (ch03)**

Ammonia can be made by reaction of water with magnesium nitride.



When the equation is properly balanced, the sum of the coefficients is

**Student Response**

1. 8.
2. 6.
3. 12.
4. 14.
5. 9.

**19. (ch06)**

From a consideration of electronic configurations, which of the elements indicated below would be classified as a *transition* element?

**Student Response**

1.  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$
2.  $1s^2 2s^2 2p^1$
3.  $1s^2 2s^2 2p^6 3s^2 3p^5$
4.  $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^5$
5.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

**20. (ch06)**

How many orbitals have the following set of quantum numbers:  $n = 3, l = 2$ ?

**Student Response**

1. 7
2. 5
3. 9
4. 1
5. 3

**21. (ch06)**

An electron in the  $n = 10$  state of a hydrogen atom emits a photon with a frequency of  $1.73 \times 10^{14}$  Hz. What is the final state of the electron? ( $c = 3.00 \times 10^8$  m/s,  $h = 6.63 \times 10^{-34}$  J s)

**Student Response**

1. 2
2. 4
3. 3
4. 0
5. 1

**22. (ch06)**

An angstrom is

**Student Response**

1. a unit of pressure.
2. a unit of time used primarily by physicists.
3. a unit of distance.
4. equal to  $10^{10}$  m.
5. a unit of force.

**23. (ch06)**

An atom in its ground state of which of the following elements has the most number of unpaired electrons?

**Student Response**

1. Se
2. As
3. Ge
4. Br
5. Ga

**24. (ch06)**

How many atomic orbitals are there in the  $n = 5$  shell?

**Student Response**

1. 10
2. 1
3. 25
4. 50
5. 5

**25. (ch02)**

Helium belongs to a group of elements called

**Student Response**

1. alkaline earth metals.
2. alkali metals.
3. chalcogens.
4. noble gases.
5. halogens.

**26. (ch02)**

A certain element is listed as having 63.5 atomic mass units. It is probably true that it contains

**Student Response**

1. a mixture of ions.
2. a mixture of neutrons.
3. a mixture of isomers.
4. a mixture of isotopes.
5. a mixture of allotropes.

**27. (ch02)**

Allotropes are

**Student Response**

1. ions with a negative charge.
2. forms of an element that have very different chemical and physical

properties.

3. forms of an element that have very similar chemical and physical properties.
4. ions with a positive charge.
5. the charged particles in a solution.

**28. (ch02)**

A series of silicon–hydrogen compounds with the general formula  $\text{Si}_n\text{H}_{2n+2}$  can be represented by the known compounds  $\text{SiH}_4$ ,  $\text{Si}_2\text{H}_6$ , and  $\text{Si}_3\text{H}_8$ . This best illustrates the law of

**Student Response**

1. conservation of mass.
2. conservation of atoms.
3. definite composition.
4. conservation of charge.
5. multiple proportions.

**29. (ch02)**

An element, X, has the following isotopic composition: X-200, 90%; X-199, 8.0%; and X-202, 2.0%. Its atomic mass is *closest* to

**Student Response**

1. 202 amu.
2. 201 amu.
3. 200 amu.
4. 199 amu.
5. It cannot be determined.

**30. (ch02)**

Choose the name-formula pair that does *not* match.

**Student Response**

1. calcium hydride,  $\text{CaH}_2$
2. nitric acid,  $\text{HNO}_3$
3. ammonium hydrogen carbonate,  $\text{NH}_4\text{CO}_3$
4. calcium hydroxide,  $\text{Ca}(\text{OH})_2$
5. sodium chlorite,  $\text{NaClO}_2$

**31. (ch04)**

All of the following are strong electrolytes in aqueous solution *except*

**Student Response**

1.  $\text{Na}_3\text{PO}_4$ .
2.  $\text{Na}_2\text{HPO}_4$ .



3.  $\text{NaH}_2\text{PO}_4$ .
4.  $\text{NH}_4\text{H}_2\text{PO}_4$ .
5.  $\text{NH}_3$ .

**32. (ch04)**

At the equivalence point during a titration of  $\text{H}_2\text{SO}_4$  with  $\text{Ba}(\text{OH})_2$ ,  
$$\text{H}_2\text{SO}_4 + \text{Ba}(\text{OH})_2 \rightarrow \text{BaSO}_4 + 2\text{H}_2\text{O}$$

**Student Response**

1. Equal volumes of  $\text{H}_2\text{SO}_4$  and  $\text{Ba}(\text{OH})_2$  have been added.
2. The number of moles of  $\text{H}_2\text{SO}_4$  equals the number of moles of  $\text{Ba}(\text{OH})_2$ .
3. The salt  $\text{BaSO}_4$  is produced and it is soluble.
4. The mixture produced is an electrolyte.
5. The mixture produced is homogeneous.

**33. (ch04)**

Consider the possible reaction when stoichiometric amounts of solutions of  $\text{Ba}(\text{OH})_2(aq)$  and  $\text{Al}_2(\text{SO}_4)_3(aq)$  are mixed. The products of the reaction are

**Student Response**

1.  $\text{BaSO}_4 + \text{Al}^{3+} + 3\text{OH}^-$
2.  $\text{Ba}^{2+} + \text{SO}_4^{2-} + \text{Al}^{3+} + 3\text{OH}^-$
3.  $\text{Ba}^{2+} + \text{SO}_4^{2-} + \text{Al}(\text{OH})_3$
4.  $\text{BaSO}_4 + \text{Al}(\text{OH})_3$
5.  $\text{Ba}_3\text{Al}_2 + \text{SO}_4(\text{OH})_2$

**34. (ch04)**

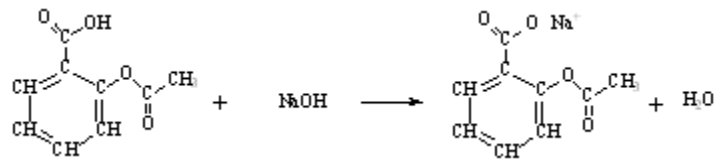
A precipitate will be formed when an aqueous carbonic acid solution is added to an aqueous solution of

**Student Response**

1. nitrous acid.
2. ammonium chloride.
3. potassium carbonate.
4. sodium chloride.
5. calcium hydroxide.

**35. (ch04)**

A 25.00 mL sample of 0.0500 M NaOH neutralized a 1.000 g sample of an aspirin tablet (as shown in the reaction below). What mass percent of aspirin was present in the sample?



### Student Response

1. 22.5%
2. 180%
3. 4.44%
4. 90.1%
5. 0.00125%

### 36. (ch04)

All of the following salts are insoluble *except*

### Student Response

1. lead(II) phosphate.
2. lead(II) sulfate.
3. lead(II) carbonate.
4. lead(II) nitrate.
5. lead(II) sulfide.