

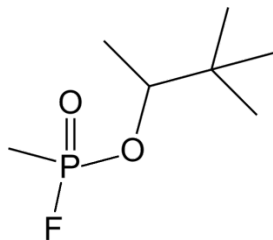
Name _____

**Chemistry Module Quiz Key for Science and Technology NPTS
Fall 2012**

1. Write the term in the blank that corresponds to the following definitions. (1½ points each)
 - a) _____ With respect to the CWC, any chemical reactant that takes part at any stage in the production by whatever method of a toxic chemical.
 - b) _____ A weapon in which the last step in the production of the toxic chemical takes place in the projectile after it is launched (to minimize the danger associated with the storage of the toxic chemical).
 - c) _____ According to the CWC, chemicals that can be used as chemical weapons or to make chemical weapons but that also have large-scale uses other than chemical weapons.
 - d) _____ Protocol on the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare...it banned first use of chemical and biological weapons but not their production and stockpiling.
 - e) _____ Chemicals that transmit signals from nerve cells (neurons) to a target cell across a synapse.
 - f) _____ Implementing body of the CWC...given the mandate to achieve the object and purpose of the Convention, to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for consultation and cooperation among States Parties.

2. Phosgene oxime, or CX, is a chemical weapon with the formula Cl_2CNOH . It is often classified as a vesicant (blister agent), but because it does not cause blisters, it is also called a nettle agent, which produces corrosive skin and tissue injury upon contact, resulting in intense itching and a hive-like rash. Draw a Lewis structure for Cl_2CNOH . All of the atoms should have their most common bonding pattern. (8 Points)

3. The following line drawing represents the nerve agent soman.
- a. Draw a Lewis structure for this agent, including all lone pairs. Note that the phosphorus atom does not have its most common bonding pattern. (8 Points)



- b. On which of the three schedules for the Chemical Weapons Convention would you expect soman to be? Why? (4 Points)
- c. Would you expect it to be on part A or part B? Why? (4 Points)

4. Identify each of the following descriptions as associated with chlorine, phosgene, sulfur mustard, hydrogen cyanide, tabun, sarin, soman, or VX. (4 points each)
- a. _____ This volatile liquid is used to make many important chemicals in industry. It disrupts cellular respiration (the conversion of nutrients and oxygen into carbon dioxide, water, and energy) by inhibiting an enzyme in mitochondria.
 - b. _____ This chemical agent causes damage through both inhalation and skin contact. It is fat-soluble, so it dissolves in the oils in the skin, causing severe chemical burns. It is primarily used to cause medical casualties, but can be lethal when large amounts are inhaled. In Pueblo, Colorado, there is a large amount of this chemical agent stored in different types of projectiles and mortars. It is all scheduled to be destroyed by chemical neutralization.
 - c. _____ This chemical agent causes suffocation by reacting with proteins in the lungs to disrupt the blood-air barrier. It is used to make important compounds, including pharmaceuticals and plastics. It smells like new-mown hay.
 - d. _____ This chemical agent was first produced in England in 1954. It disrupts the mechanism by which nerves transfer messages to organs, causing seizures and loss of body control. A small drop on the skin could kill an adult in fifteen minutes. When sprayed on the ground, it remains lethal for up to three weeks, so it is an area denial weapon. The U.S. still has some of this agent stored in Bluegrass, Kentucky. It will be destroyed by chemical neutralization.
5. Write a description of the effects of nerve agents on the body and explain why atropine and 2-PAM act as antidotes. (Your description should include mention of nerve cells, neurotransmitters, acetylcholine, receptor sites, acetylcholinesterase, the on-off mechanism of nerve cells, and competition for receptor sites.) (8 Points)

