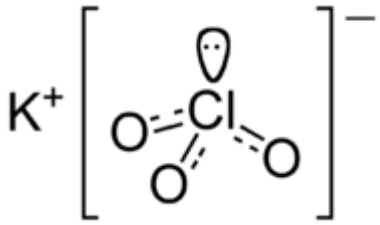
1. **Read the article and choose from the list A-L the best phrase to fill each of the spaces 1-12.**

POTASSIUM CHLORATE



Adapted from http://en.wikipedia.org/wiki/Potassium_chlorate

Potassium chlorate is a compound containing potassium, chlorine and oxygen, with the molecular formula $KClO_3$. In its pure form, **1.** ..... it. It is the most common chlorate in industrial use, and is usually present in well-stocked laboratories. It is used

- as an oxidizing agent,
- to prepare oxygen,
- as a disinfectant,
- in safety matches,
- **2.** .....
- in cultivation, forcing the blossoming stage of the Longan tree, causing it to produce fruit in warmer climates.

Chlorate-based propellants are more efficient than traditional gunpowder and are **3.** ..... However, they can be extremely unstable in the presence of sulfur or phosphorus and are much more expensive. Chlorate propellants must be used only in equipment designed for them; failure to follow this precaution is a common source of accidents. Potassium chlorate, often in combination with silver fulminate, is used in trick noise-makers known as **4.** ....., a popular type of novelty firework.

Potassium chlorate is often used in high school and college laboratories to **5.** ..... because it is a far cheaper source than a pressurized or cryogenic oxygen tank. Potassium chlorate will readily decompose if heated in contact with a catalyst, typically manganese (IV) dioxide (MnO_2). Thus, it may be simply **6.** ..... . If the test tube is equipped with a one-holed stopper and hose, warm oxygen can be drawn off. The reaction is as follows:

$$2KClO_3(s) + \text{heat} \rightarrow 3O_2(g) + 2KCl(s)$$

The safe performance of this reaction requires very pure reagents and careful temperature control. Molten potassium chlorate is **7.** ..... and will spontaneously react with many common materials. Explosions have resulted from liquid chlorates spattering into the latex or PVC tubes of oxygen generators, as well as from contact between chlorates and hydrocarbon

sealing greases. Impurities in potassium chlorate itself can also cause problems. When working with a new batch of potassium chlorate, it is advisable to take a small sample (~ 1 gram) and **8.** ..... . Contamination may cause this small quantity to explode, indicating that the chlorate should be discarded.

Potassium chlorate can **9.** ..... to form a highly reactive solution of chloric acid and potassium sulfate:

$$2\ KClO_3 + H_2SO_4 \rightarrow 2\ HClO_3 + K_2SO_4$$

When sugar is added to this reaction, it burns:

$$8\ HClO_3 + C_{12}H_{22}O_{11} \rightarrow 11\ H_2O + 12\ CO_2 + 8\ HCl$$

Safety

Potassium chlorate should be handled with care. It reacts vigorously, and in some cases spontaneously ignites or explodes, when **10.** ..... . It will burn vigorously in combination with virtually any combustible material, even those which are considered to be only slightly flammable normally (including ordinary dust and lint). Mixtures of potassium chlorate and a fuel can be ignited by contact with sulfuric acid and this **11.** ..... . Sulfur should be avoided in pyrotechnic compositions containing potassium chlorate, as these mixtures are prone to spontaneous deflagration. Most sulfur contains trace quantities of sulfur-containing acids, and these can cause spontaneous ignition - "Flowers of sulfur" or "sublimed sulfur". Despite the overall high purity, it contains significant amounts of sulfur acids. Also, mixtures of potassium chlorate with any compound with ignition promoting properties (ex. antimony(III) sulfide) are very dangerous to prepare, as **12.** ..... .

A. less susceptible to damage by water
B. generate oxygen gas
C. reagent should be kept away from potassium chlorate
D. placed in a test tube and heated over a burner
E. an extremely powerful oxidizer
F. heat it strongly on an open glass plate
G. react with sulfuric acid
H. mixed with many combustible materials
I. is a white crystalline substance
J. in explosives and fireworks,
K. they are extremely shock sensitive
L. "crackers", "snappers", "pop-its", or "bang-snaps"

2. Explain the underlined expressions.