# The chemistry of chemical weapons: answers

***Education in Chemistry***November 2019
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**1. a.**  Molecular formula of mustard gas C4H8SCl2

 Chlorine has two isotopes; 75% Cl-35 and 25% Cl-37

 **Explanation of peak** **Explanation of abundance**

 *m/z* 158 = C4H8S35Cl35Cl 3 × 3 = **9**

 *m/z* 160 = C4H8S35Cl37Cl (3 × 1) × 2 = **6**

 *m/z* 162 = C4H8S37Cl37Cl (1 × 1) = **1**

 b. *m/z* 109/111 [ClCH2CH2SCH2]+

 *m/z* 63/65 [ClCH2CH2]+

**2.** a.

b**.** 10,000 l = 10 m3

 Air breathed in per minute = 10 m3 / (24 × 60) = 6.94 × 10-3 m3 min-1

Sarin inhaled per minute = 6.94 × 10-3 m3 min-1× 100 mg m-3 = 0.694 mg min-1

Time taken to inhale 0.5 mg = 0.5 mg / 0.694 mg min-1 = 0.72 min = **43 s**