

Summary of Effects of Chemical Agents

1) Ocular

Agent	Symbol	Odour	Mechanism of action	Eyes (pupils)	Eyes (conjunctivae)	Rest of eye
Tabun Sarin Soman GF VX	GA GB GD GF VX	None or faint sweetish, fruity or paint-like None	Anticholinesterase agents	Miosis	Redness	Pain, especially on focusing dimness of vision, headache, lachrymation
Mustard and nitrogen mustard	H HD HN	Garlic or horseradish, irritating. None or fishy, irritating	Vesicants. Bone marrow depressant. Alkylating agents, damages DNA	Mydriasis	Redness, oedema, irritation, gritty pain	Oedema of lids, pain, blepharospasm, photophobia, lachrymation, corneal ulceration and possibly scarring
Lewisite and other arsenical vesicants	L	Fruity to geranium-like. Irritating	Vesicants. Arsenical poisons		Prompt redness, oedema, irritation	Immediate burning sensation, iritis, corneal injury
Mustard/Lewisite mixture	HL	Garlic-like	Like Lewisite and mustard	Like HD, HN and L	Like HD, HN and L	Like HD, HN and L
Phosgene oxime	CX	Unpleasant and irritating	Powerful vesicant		Volently irritating, redness, oedema	Corneal injury with blindness lachrymation
Phosgene	CG	Green com, grass or new-mown hay	Lung damaging agent		Irritation	Lachrymation (after respiratory symptoms)
Hydrogen cyanide	AC	Faint bitter almonds	Interferes with oxygen utilisation at cellular level			
Cyanogen cyanide	CK	Very irritating	Like hydrogen cyanide, lung irritant		Irritation	Lachrymation
Vomiting agents	DM DA DC	Burning, fireworks, v irritating	Local irritant, induces vomiting		Irritation	Lachrymation
Irritant agents	CN	Irritating	Local irritant		Redness, irritation	Pain, blephorospasm, profuse lachrymation, photophobia
	CS CR	Very irritating, pungent, pepper-like	Local irritant		Intense irritation	Pain, blephorospasm, lachrymation, photophobia
Incapacitating agents	BZ	None	Anticholinergic	Myadris		Blurred vision
	LSD	None	Psychomimetic	Mydriasis		

2) Nose and Throat; respiratory; skin; GI tract, cardiovascular

Symbol	Nose and Throat	Respiratory	Skin	GI tract	Cardiovascular system
GA GB GD GF VX	Increased salivation, rhinorrhoea	Tightness in the chest, bronchoconstriction, occasional wheezing, increased bronchial secretion, cough, dyspnoea, substernal tightness	Sweating, pallor then cyanosis	Salivation, anorexia, nausea, vomiting, abdominal cramps, epigastric tightness, heartburn, eruction, diarrhoea, tesmus, involuntary defecation	Occasionally early transient tachycardia and/or hypotension followed by bradycardia and hypotension
H HD HN	Swelling irritation, ulceration, discharge, occasional oedema of larynx	Slowly developing irritation, hoarseness, aphonia, cough, tightness, dyspnoea, rales. Pneumonia, fever, pulmonary oedema in severe cases. Risk of secondary infection	No immediate signs. After minutes to hours, redness and burning. Several hours later necrosis, generally limited to epidermis. Delayed hyper- and hypo-pigmentation. Moist areas affected most. Risk of secondary infection.	Pain, nausea, vomiting, diarrhoea	Shock after severe exposure
L	Prompt irritation	Rapid irritation, hoarseness, aphonia, cough, pneumonia, fever, pulmonary oedema, pleural effusion in severe cases	Prompt burning. Red within 30 mins. Blisters on 1st or 2nd day. Pain worse and necrosis deeper than H	Diarrhoea, nausea, vomiting, hepatic failure	Shock after severe exposure. Haemolytic anaemia, haemo-concentration
HL	Swelling irritation, ulceration, discharge, occasional oedema of larynx	Slowly developing irritation, hoarseness, aphonia, cough, tightness, dyspnoea, rales. Pneumonia, fever, pulmonary oedema in severe cases. Risk of secondary infection	No immediate signs. After minutes to hours, redness and burning. Several hours later necrosis, generally limited to epidermis. Delayed hyper- and hypo-pigmentation. Moist areas affected most. Risk of secondary infection.	Pain, nausea, vomiting, diarrhoea	Shock after severe exposure
CX	Very irritating to mucous membranes	Rapid irritation and coughing. Later pulmonary oedema	Immediate severe irritation and intense pain. Within 1 min the affected area turns white, surrounded by erythema. Swollen within 1 hr; blistered after 24 hrs. Necrosis may occur. Long recovery – 1-3 months.		
CG	Irritation	Coughing, choking, chest tightness on exposure. Latent period, then pulmonary oedema, dyspnoea, frothy sputum, rales, pneumonia and fever	Possible cyanosis following pulmonary oedema	Nausea, occasional vomiting after respiratory symptoms	Shock after severe exposure hypotension and tachycardia
AC		Deep respiration followed rapidly by dyspnoea, gasping then cessation of respiration	Initially pinker than usual; may change to cyanosis	Nausea	Profound hypotension
CK	Irritation	Irritation, cough, choking, dyspnoea; pulmonary oedema can be rapid		Like hydrogen cyanide	
DM DA DC	Pain, rhinorrhoea tightness, sneezing	Tightness and pain, uncontrollable coughing	Stinging, (especially of face) occasional dermatitis	Salivation, nausea, vomiting	

continued>>

Symbol	Nose and Throat	Respiratory	Skin	GI tract	Cardiovascular system
CN	Irritation, burning	Tightness and irritation if concentration is high	Stinging, (especially of face) occasional dermatitis, may blister	Occasional vomiting	
CS CR	Irritation, burning, tightness	Tightness in chest and difficulty breathing	Stinging, occasional, dermatitis, may blister	Nausea and vomiting	
BZ	Extreme dryness		Dry, flushed	Constipation	Tachycardia, elevated blood pressure
LSD		Sweaty palms, cold extremities			Tachycardia

3) Genitourinary; CNS; Miscellaneous; Treatment

Symbol	GU system	CNS	Other	Treatment
GA GB GD GF VX	Frequent micturition, urinary incontinence	Apprehension, giddiness, insomnia, headache, drowsiness, difficulty concentrating, poor memory, confusion, slurred speech, ataxia, weakness, coma with areflexia, Cheyne-Stokes respiration, convulsions	Fasciculations, easy fatigue, cramps, weakness (including respiratory muscles) paralysis	Pre-treatment with pyridostigmine. Post exposure therapy: a. Anticholinergic blockage eg. atropine b. Enzyme reactivation – oximes c. Anticonvulsant eg diazepam d. Assisted ventilation e. Suction for respiratory secretions
H HD HN		Anxiety, depression	Late depression of bone marrow, malaise and prostration	Eyes: antibiotics, cyclopegics and systemic analgesia. Skin: local dressings and antibiotics for infection. Antibiotics for respiratory infection. IV fluids
L	Renal failure	Anxiety, depression	Systemic arsenic poisoning	Like sulphur and nitrogen, mustards. BAL in oil IM for systemic chelation. BAL ointment for eyes and skin
HL		Anxiety, depression		Like sulphur mustard, nitrogen mustard and Lewisite
CX		Anxiety, depression		Apply dressings of sodium bicarbonate. Systemic anagesics. Treat as any other skin lesions
CG		Anxiety, depression		Sorticosteroids IV and inhalation promptly may be life-saving. Rest, oxygen, antibiotics
AC		May have initial excitation; then depression, giddiness, headache, irrational behaviour, ataxia, convulsions or coma		Drugs binding cyanide: a. Methaemoglobin formers; nitrates or DMAP b. Scavengers; dicobalt edetate and hydroxocobalamin c. Provision of S-groups; thiosulphate, assisted vent, O ₂
CK				Like hydrogen cyanide and phosgene
DM DA DC		Severe headache, mental depression	May cause desire to remove respirator	Wear mask in spite of symptoms. Spontaneous improvement
CN CA		Headache		Spontaneous improvement. Analgesic eye and nose drops if necessary
CS CR		Headache		Symptoms disappear rapidly in fresh air
BZ	Urgency, urinary retention	Headache, giddiness, drowsiness, disorientation, hallucinations and occasional maniacal behaviour. Ataxia and/or lack of coordination		Restraint, cool environment. Physostigmine. Treatment may be required over several days
LSD		Mental excitation, poor concentration, tremor indecisiveness, inability to act in a sustained or purposeful manner. Hallucinations	Pyrexia	Reassurance, restraint, prompt evacuation, diazepam