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Collection and detection of materials for veterolegal and chemical examination in case of poisoning: A short note

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Abstract
Accidental poisoning is the most frequently found in animals due to indiscriminate feeding habits. Intentional poisonings include those in which a potentially toxic agent was administered to an animal without intent of causing harm and those cases where the toxic agent was intended to cause harm to an animal (malicious poisoning). In general, cases of animal toxicity that are raised to the status of legal cases are not common, but these cases require thorough and detailed examination to fulfill the evidentiary requirements of the legal system. In veterolegal cases of suspected poisoning the chemical examination is helpful to find out actual cause of death.

Keywords: accidental, intentional, poisoning, Veterolegal, chemical examination

Introduction

Any substance which when applied either externally or internally produces harmful effects on health and when used in the wrong way, wrong amount and by the wrong individual is called poison. Poison is almost always conveyed in food or water. Man-made (synthetic) substance that presents a risk of death, disease, injury, or birth defects in living organisms through absorption, ingestion, inhalation, or by altering the organism's environment known as toxicants**.** In veterolegal cases of suspected poisoning the chemical examination is helpful to find out actual cause of death.

Collection and submission of specimens for chemical examination

Following specimen should be sent for chemical analysis.

Table1

Suspected poison	Required material in order of importance			
	1	2	3	4
Arsenic (Acute)	Liver	Kidneys	Stomach contents	
Arsenic (chronic)	Hair	Liver	Urine	
Alkaloids	Liver	Urine	Brain	Stomach contents
Copper	Liver			
Cyanide	Stomach content	Liver	Oxalated blood	
Insecticide (Chlorinated)	Fat	Liver	Stomach content	
Insecticides (Organophosphate)	Oxalated blood	Whole blood	Liver	Stomach contents
Lead (Acute)	Kidneys	Liver	Urine	
Lead (Chronic)	Hair	Liver	Kidneys	Urine
Mercury	Liver	Kidneys	Stomach contents	Intestinal contents
Nitrate and Nitrite	Stomach contents	Whole blood		
Phosphorus	Stomach contents	Liver	Oxalated blood	
Phenols-cresols	Liver	Stomach contents	Kidney	
Rodenticides	Stomach contents	Liver	Urine	
Strychnine	Stomach contents	Urine	Liver	Brain
Sodium chloride	Oxalated / whole blood	Brain	Stomach content	Liver

Source: Veterinary Jurisprudence. S.N. Sharma, A.K. Gahlot, K. Tanwar R. 2015. 7th Edition

The following are the minimum quantities of the specimens to be sent for toxicological examination

Table 2

Specimens	Minimum quantities	Specimens	Minimum quantities
Blood	30 to 50 ml	Kidneys	One
Brain	Entire	Liver	500-1000g
Fat	200g	Stomach contents large animals	500-1000g
Hair	5-10g	Stomach contents small animals	All available
Intestinal content	500-1000g	Urine	All available

Source: Veterinary Jurisprudence. S.N. Sharma, A.K. Gahlot, K. Tanwar R. 2015. 7th Edition

Unless the specimen are forwarded to the chemical examiner they may be preserved for a period of six months, and then may destroyed after obtaining the permission from the magistrate.

When the Veterinary officer forwards articles to the Chemical examiner he should at same time address a letter to that officer on the authorized from advising him of their dispatch. This letter should contain:

1. Animals species, age, sex identification mark, and location of lesions
2. An impression of the seal used in closing the bottle and a description of the seal.
3. A list of articles forwarded and mode of transmission (by post, rail or constable).
4. A separate necropsy reported should be sent.
5. Full details of the purpose for analysis are required.
6. The bottle should be well packed to prevent breakage during transit.
7. The bottles should be labelled and properly sealed.
8. The same seal is to be used all through and the same sealing material.
9. Note the reference number of your letter of advice to the Chemical Examiner on the lebels of the bottles. (Sharma *et al.,* 2015) [14].

Table 3: common toxicants and their methods of detection

Toxicants	PM findings	Diagnostic Test	Positive Results
Arsenic	Intense rose red inflammation and oedema of GI tract.	Reinsch test (Ozo *et al*., 2004) [12]	black deposit in positive cases
		Marsh test (Hindmarsh *et al*., 2004; Jensen, 2014) [7]	Blue flame
		Gutzeit test (Kinniburgh and Kosmus, 2002) [8]	Yellowish
Antimony	Acute gastro-enteritis, fatty degeneration of liver, toxic nephrosis, phlegmonous gastritis	Reinsch test (Sharma *et al*.,2015) [14]	bluish black deposit in positive cases
		Marsh test(Sharma *et al*.,2015; Rigby and Brindle, 1999) [14, 13]	Bluish-green flame
Mercury	Cooked appearance of oral mucosa, tongue, pharynx and oesophagus, dark red blood which coagulates slowly, formation of diphtheritic membrane in LI.	Reinsch test (Ozo *et al*., 2004) [12]	Bright silvery coated forms
		Stannous chloride test (Dufault *et al.*, 2009; Cabañero *et al*.,2004) [3, 1]	White precipitate
		KI	Yellow then red precipitate
		Diphenyl carbazone (Fan *et al*.,2008) [4]	Violet blue colour
Lead		H2So4	White precipitate in positive cases.
		KI test (Haque *et al*., 2006) [5]	Bright yellow precipitate
		Ammonia	White
Copper	Feigl, F., and Anger, V. (2012). *Spot tests in inorganic analysis*. Elsevier.	Potassium ferrocyanide	Reddish brown precipitate
		Ammonia	Green precipitate
		Hydrobromic test	Rosy red or violet colour in positive cases
		Electrolysis test	Electrolysis on a platinum electrode
Molybdenum	Loss of melanin, Haemosiderosis of lymphnode and degerative changes in liver.	-	-
Selenium	Acute - Generalised haemorrhages Sub-acute - Degeneration and focal necrosis of liver Chronic - Atrophy of organs	-	-
Zinc		K, Na and NH4 hydroxide:	White precipitate
		Hydrogen sulphide	White precipitate
		Potassium ferrocyanide	White gelatinous precipitate
Silver		HCl: White precipitate	Brown precipitate
		Na and K hydrate	
		KI	Curdy yellow precipitate
		Ammonium hydrate	Greyish precipitate
		Potassium chromate	Red precipitate
Phosphorus		Scherer's test	black colour in positive
		Mitscherlich's test	Luminous vapour can be seen
		Phosphine test	Black precipitate

Sodium chloride	Severe gastroenteritis, hydro pericardium, cerebral oedema, oedema of skeletal muscles.	-	-
Phenol or Carbolic acid	Gastroenteritis	Million's test	Red colour
		Lex's test	Bluish colour
		Brominated water (Kuramochi *et al*., 2014)	Yellowish white precipitate
		Ferric chloride test	Blue violet colour
Opium		Meconic acid test	Red colour in positive case
Morphine		Marquis's test	Violet colour
		Husemann's test	Red violet or blue colour
		Frohde's molybdic test	Rose red
		Nitric acid test	Yellow colour
		Sulphuric acid test	Brown colour
Atropic alkaloids		Mydriatic test	Instill patient's one drop of urine to eye of cat, dog or rabbit. Examine after 30 min for dilation of pupil
		Gerrard's test	Atropine give red colour
		Vitali's test	Dark red colour
		Bromin test	Crystals of various shape forms
Barbiturates		Zwikker test	Dark blue colour
		Copper-pyridine test	Violet colour
		Permanganate test	Decolourisation
Chloral Hydrate		Ammonium sulphide test	Red precipitate
		Phloroglucinol test	Deep red
		Resorcinol	Red colour
Strychnine	Dark and thin venous blood, early rigor mortis	Colour test	Yellow colour
		Physiological test	Injecting the solution to dorsal lymph sac of frog will produce tetanic convulsions. Similar spasms will produce by pinching the skin
Cyanides		Prussian blue test (Morocco, 2005)	Bluish green colour
		Sulphocyanide/Thiocyanate test	Blood red colour
		Silver nitrate	Needle shaped crystal formation
Nitrates and Nitrites		Rivanol paper strip test (Nitrite poisoning)	
		Anion chromatographic method	
Carbon Monoxide		Alkaline Haematin test	Using NaOH. Retain Pink colour
		Katayama's test (Ushiyama *et al*., 2004) [16]	Remain red
		Kunkel's test	Crimson red coagulum
		Spectroscopic Exmn	Typical Hb-Co spectrum
Organo-phosphorus compounds		Test-mate ChE field test	Used to determine levels of Red Blood Cells (RBC), AChE and plasma (pseudo) cholinesterase (PChE) in the blood in about four minutes
Carbon Tetrachloride	Gstro-enteritis Fatty degeneration of liver Cloudy swelling and necrosis of liver Pneumonia	Resorcinol test (Tang *et al*., 2012)	Greenish brown colour on heating
Phenothiazine	Enlargement of liver, kidney, spleen; dark red urine in bladder, lesions of jaundice	Collier's test	Red colour
		Ferric chloride test	Green colour
		De Eds- Thomas test	Red colour
Nicotine		Biological test using frog	
		Meizer's test (Chennaiah *et al*., 2011) [2]	Deep red colour
		Schindelmeiser's test (Mitchell, 1924) [10]	Rose to red colour
		Odour test	Characterestic odour of tobacco
Ergot	Gangrene of extemities, degenerative lesions on CNS.	Chemical test for alkaloids can be done	

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