Baghdad University **Clinical Analysis**
College of Sciences for Women **Lab-2 / 4st Class**
Biology Department **Dr. Rasha Majid Abd-ulameer**

General Urine Examination

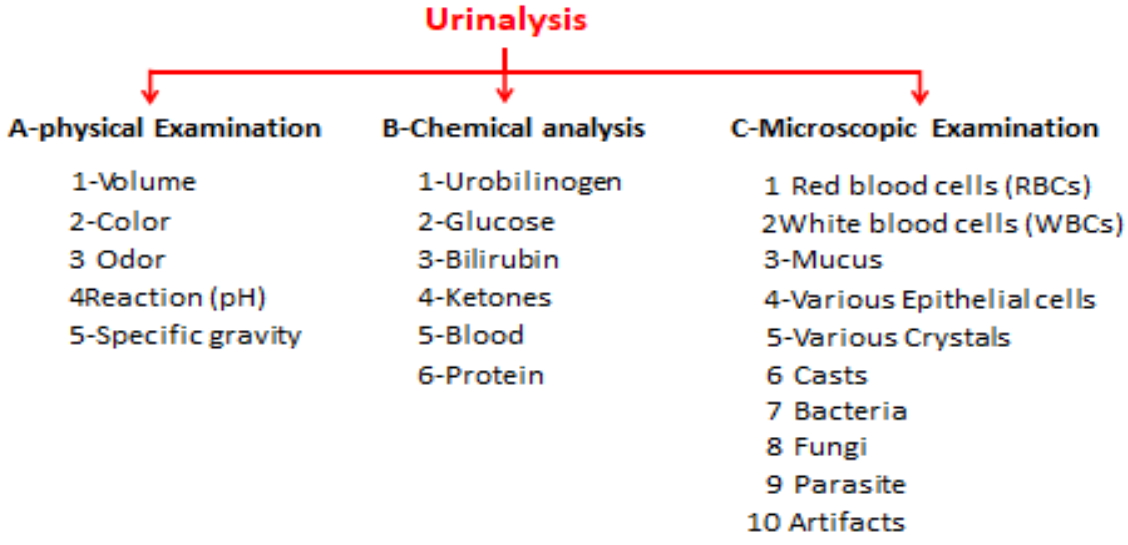
Definition

Urinalysis is a diagnostic physical, chemical, and microscopic examination of a urine sample (specimen).
Urine contents: (water 95%, urea, uric acid, creatine, sodium, potassium, chloride, phosphate).

Urine collection and transport:

Collecting a urine sample from emptying the bladder takes about two or three hrs. The sample can be collected at home as well as in a doctor's office. Urine specimens are usually collected early in the morning before breakfast. Urine collected eight hours after eating and at least six hours after the most recent urination is more likely to indicate abnormalities. Some people may be asked to void into a clean container before getting out of bed in the morning.

Urinalysis; what to look for ?



1-Physical properties:

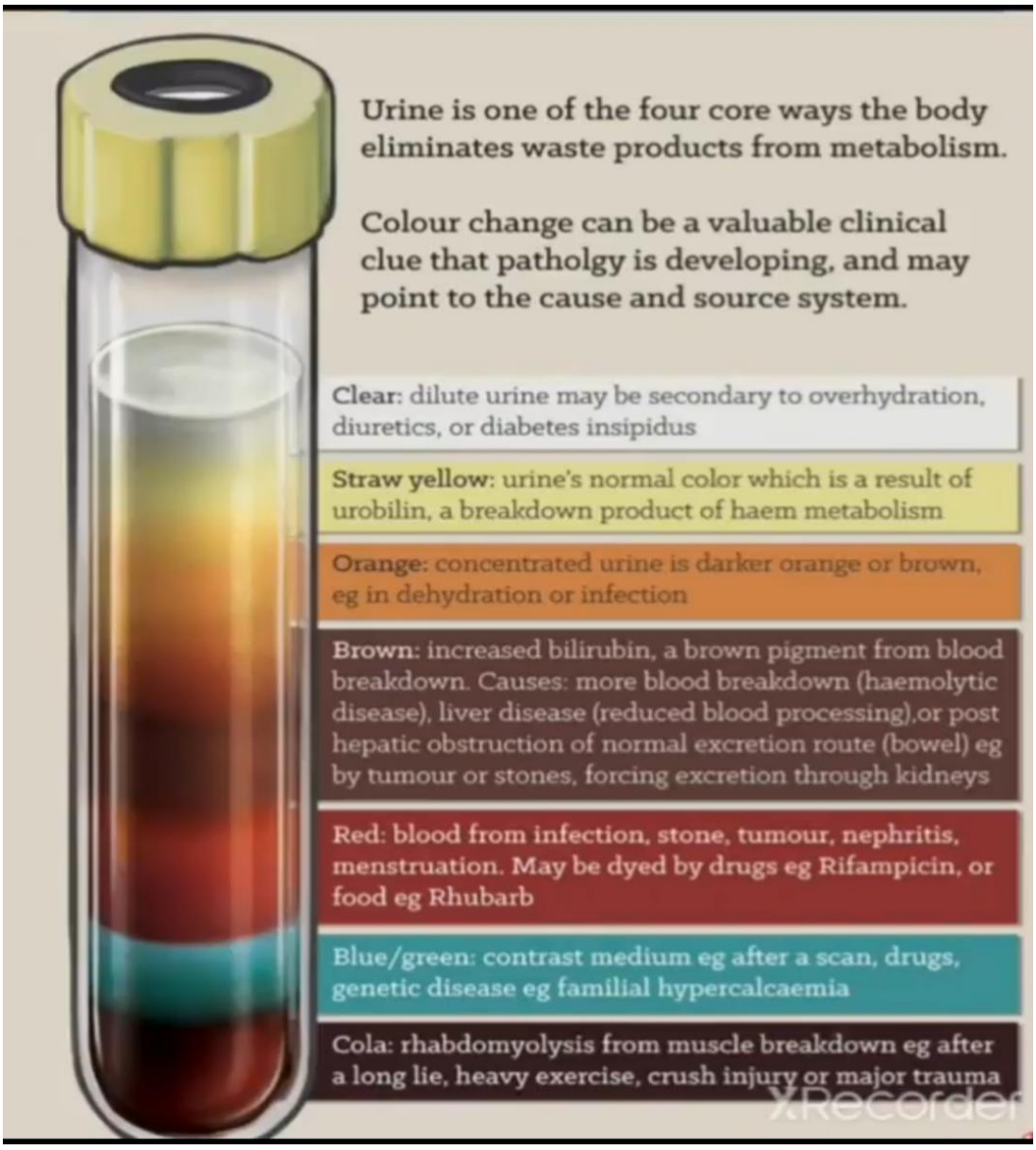
Volume:

Normally 1.5 liter/day.
If more than 2 liters/day named as polyuria (in diabetes or in chronic renal diseases)
If less than 1 liter/day named as oligouria (in case of excessive sweating , vomiting and diarrhea).

Color:

Normal color: is yellow or amber yellow.
Abnormal colors:
1.**Colorless** (polyuria).
2. **Orange** (due to antibiotic intake or eating certain foods).
3. **Brownish or greenish** (Bilirubin >2mg/dl in blood).
4. **Reddish** (RBC's due to stone or blood menstruation).
5. **Milky** (usually in male due to sperms in urine).
6. **Cloudy with offensive odor** (due to pus, crystals or epithelial cells).

Urine samples



Odor:

Normally with aromatic odor.

Abnormally:

Offensive odor due to pus increase.

Acetone odor due to ketones increases (ketonuria).

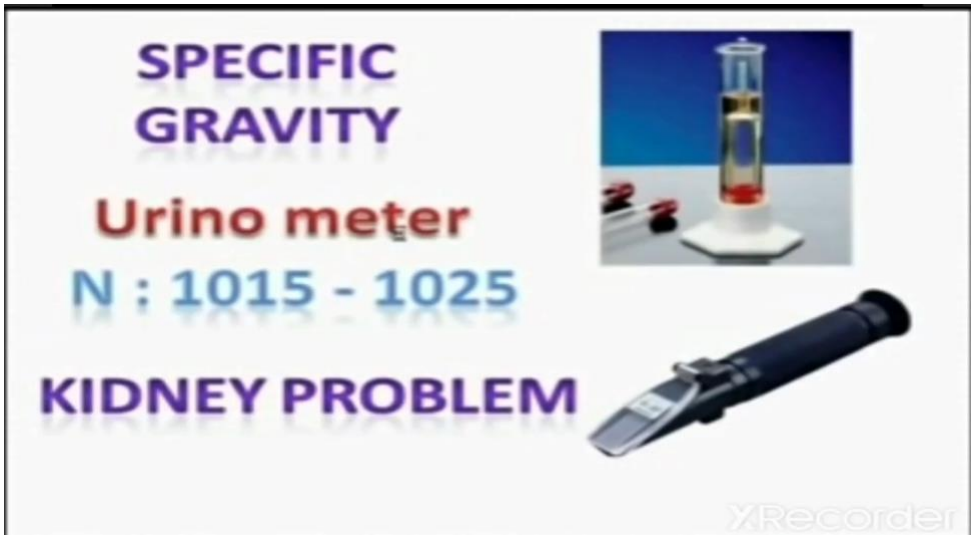
Aspect:

As you see the urine specimen clear, semi turbid or turbid.

Urine samples

Specific gravity:

patients must collect samples during 24 hrs.
Normally : 1015 – 1025
In the report write Q.N.S (quantity not sufficient) when the quantity is not sufficient .



Specific gravity meter

PH:

Acidic or alkaline (may be caused by eating excess of fruits or vegetables).

2-Chemical properties:

- The chemical analysis of urine undertaken to evaluate

the levels of the following component:-

- Urobilinogen
- Glucose
- Bilirubin
- Ketones
- Blood
- Protein

- The presence of normal and abnormal chemical elements in the urine are detected using dry reagent strips called dipsticks
- When the test strip is dipped in urine the reagents are activated and a chemical reaction occurs.
- The chemical reaction results in a specific color change
- After 60 seconds , this color change is compared against a reference color chart.

Protein or albumin:

Normally : Nil
Abnormally : trace , **+ , ++ , +++** ,according to the read of protein strip .
Diseased case : due to increase in pus or RBC's.
Undiseased case : due to eating excess of proteins or during pregnancy (usually in the third trimester)

Albumin (protein) test:

1. Prepare 1 ml of urine in a test tube then heat gently till ebullition .
2. If the solution becomes turbid that indicates the presence of albumin or amorphous urate.

So you must put acetic acid for insurance if the turbidity precipitated so it is Am. urate, if still turbid so it is albumin in urine.

protein in urine

This picture shows the protein (albumin) in different urine samples

Glucose:

Trace , **+ (160-195) , ++ (>200) , +++ (250-300)**. according to the read of glucose strip.

Test for Reducing Sugar: (Glucose)

Test	Observation	Inference
Benedict's test: Take 5ml Benedict's reagent in test tube then add 8drops of urine sample and Boil it for 1-2 min and observe.	Green or yellowish green or orange or red precipitate obtained	Reducing sugar confirmed Therefore urine contains reducing sugar

October 11, 2018 14

Colour of the precipitate	Degree of Glycosuria	Approx. Glucose Conc. (gm(%
Green precipitate	+	%0.5
Yellow precipitate	+ +	%1.0
Orange precipitate	++ +	%1.5
Brick Red precipitate	+ ++ +	2.0or more

Glucose in urine (strip)

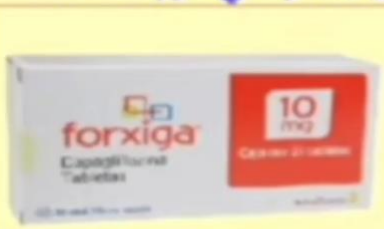

فحص السكر بالبول بالمختبر

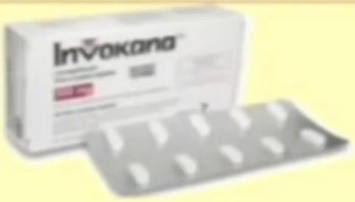

نموذج شرايط فحص السكر بالبول
شرايط فحص السكر بالبول
لايوجد سكر
100
250
500
1000
2000
او اكثر
تغمر الشريط بالبول وتقارن اللون مع المربعات
قارن اللون الشريط مع المربعات لتعرف مستوى السكر بالبول

الاشخاص ياخذون دواء

Forxiga او Invokana

لايجوز فحص السكر بالبول لانه يعطي نتيجه خطا





شرايط فحص السكر بالبول ليس بديل فحص السكر بالدم

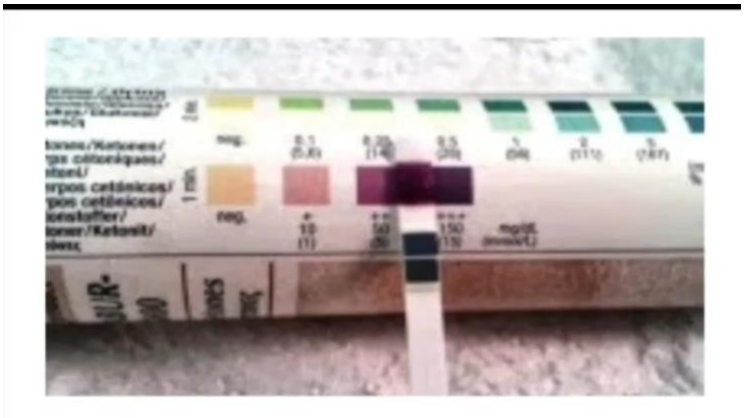
لانه لايعطي درجة ارتفاع السكر المضبوط

اذا لاتوجد شرايط فحص السكر بالدم ممكن تستعمل فحص السكر بالادرار

مثلا : تفحص بالمدرسه او سفرة او في مقر العمل

Acetone:

Mainly : acetone increases by increasing glucose(>200) .
Note: The patient when intake the drug of glucose laboratory examination result is glucose is normal but acetone is hyper.



Acetone in urine (strip)

Table 4. Comparison of urine and blood ketones. Adapted from Brink S, Laffel L, Likitmaskul S, et al.[13]

Urine ketones		Blood ketones (ß-hydroxybutyrate)
Negative	<0.5 mmol/L	≤0.5 mmol/L
Trace	0.5 mmol/L	0.6–0.9 mmol/L
Small	1.5 mmol/L	1.0–1.4 mmol/L
Moderate	4.0 mmol/L	1.5–2.4 mmol/L
Large	8.0 mmol/L	2.5–2.9 mmol/L
Very large	16 mmol/L	≥3.0 mmol/L

Comparision of urine and blood ketones

TEST FOR Ketone bodies-:

- **Principle:** Acetone in urine after saturation with ammonium sulphate crystals dissociate into acetate ions which combines with sodium nitropursside in alkaline medium to from permagnate colour sodium nitropursside acetate ion complex.

TEST FOR Ketone bodies-:

Test	Observation	Inference
Rothera's test : Saturate 5 ml of urine with Rothera's mixture and then add 1-2 ml of conc. Ammonia solution. Gently mix by rotation and allow to stand and observe.	Permagnate colour or deep purple ring is observed at the junction of two layers	Acetone and acetoacetic acid present. Therefore urine contains ketone bodies.

Ketones or Acetone test

Ascorbic acid (Vitamin C):

Due to excess in Vitamin C intake and have no side effects.

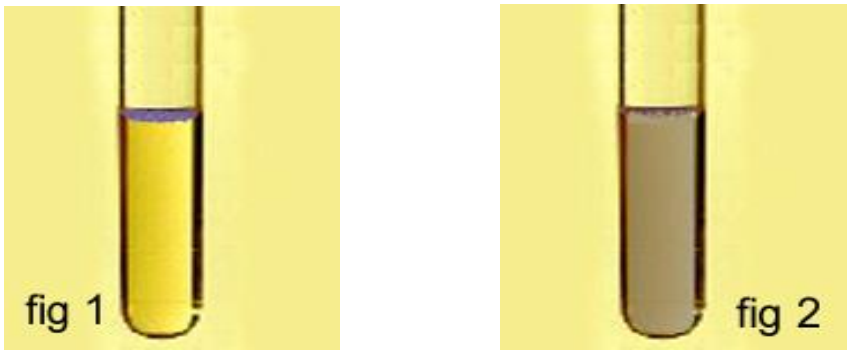
Ascorbic acid in urine (strip)

Mucous:

You can see it during examination of urine slide after centrifugation .
Appears as mucous threads by your naked eye.
Mainly happen in males at masturbation age or indication to inflammation in prostate after 60 year of age.

Bilirubin test:

1. Prepare 1 ml of urine in a test tube then put 2 -3 drops Iodine on the wall of test tube gently.
2. A violet ring appeared on the surface of urine (fig 1).
3. Shake the tube, then solution becomes violet or brownish (fig 2).



Bilirubin test

Urine strip shows bilirubin (strip)

Test for Bile salts and bile pigments

- **a). Hay's Sulphur powder test for bile salts**
- **Principle:** Sulphur powder sinks down in test tube containing urine sample because bile present in urine contain bile salts which acts as emulsifying agent reduces the surface tension of urine sample.

Test	Observation	Inference
Hay's Sulphur powder test : Take 3ml urine in a test tube and sprinkle a pinch of sulphur powder and observe.	Sulphur powder sinks down to bottom of the test tube.	Bile salts confirmed. Therefore urine contains bile salts.
Control: Take 3ml water in a test tube and sprinkle a pinch of sulphur powder and observe	Sulphur powder floats.	

b). Fouchet's test for bile pigments

- **Principle:** Bile pigments present in urine solution reacts with $BaCl_2$ to form white precipitate. When this is dried and reacted with fouchet's reagent green or bluish green colour precipitate is obtained due to formation of complex derivative.

Test	Observation	Inference
Fouchet's test : Take 3ml urine solution in test tube. add 2 ml 10% $BaCl_2$. until thick white precipitate is obtained. Filter it and to the precipitate on the filter paper add few drops of Fouchet's reagent and observe.	Colour changes from yellow to pista green	Bile pigments confirmed. Therefore urine contains bile pigments.

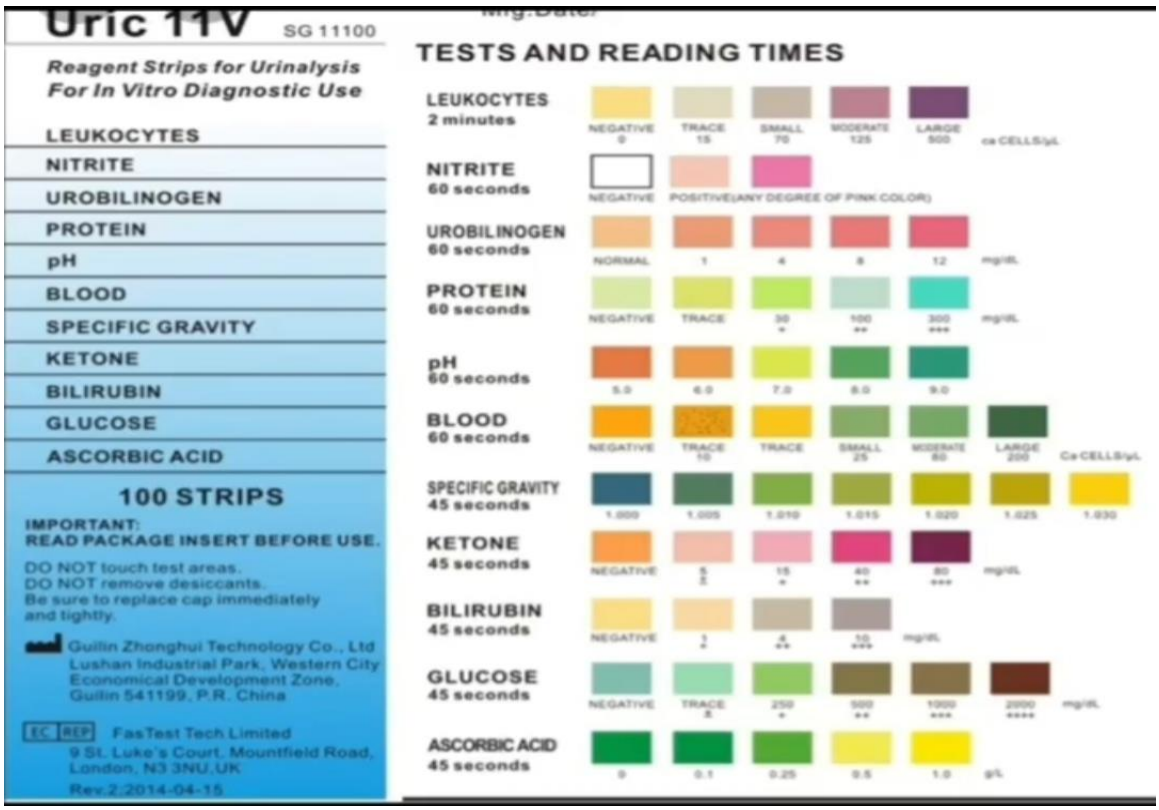
Blood Test :

Test for Blood-:

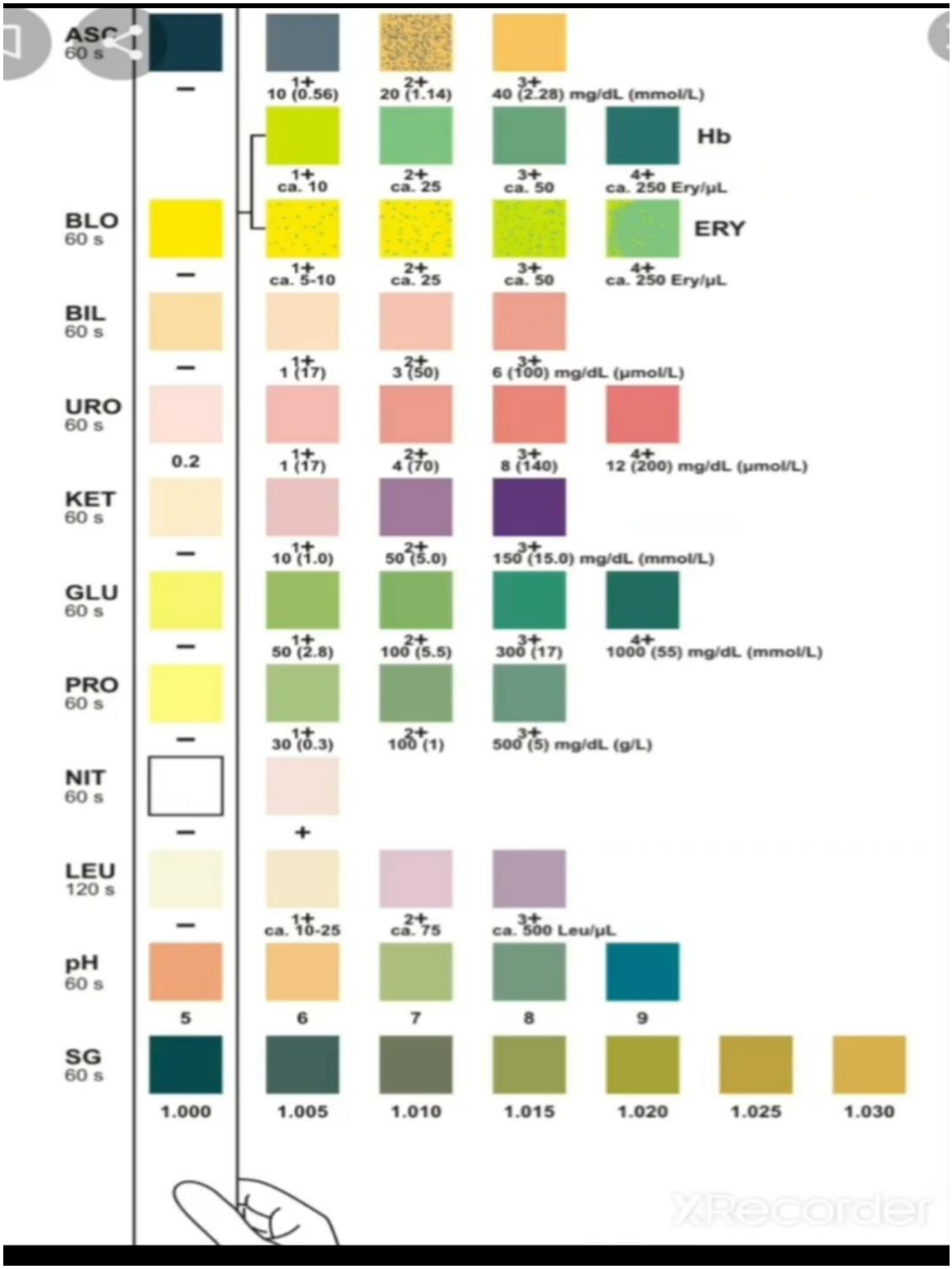
Test	Observation	Inference
Benzidine Test : Take 2ml of urine in a test tube and boil for 5min. Cool it. Mix equal volume of benzidine solution (2-3ml) and H_2O_2 in a test tube and add the boiled cooled urine into the test tube	Blue colour solution later turns green	Blood is present in urine. Therefore urine contains blood

- **Note:** -Normal urine contains any RBC but few leucocytes & epithelial cells may be present.

Urine strip shows Blood Test. (strip)



Urine strip for biochemical properties



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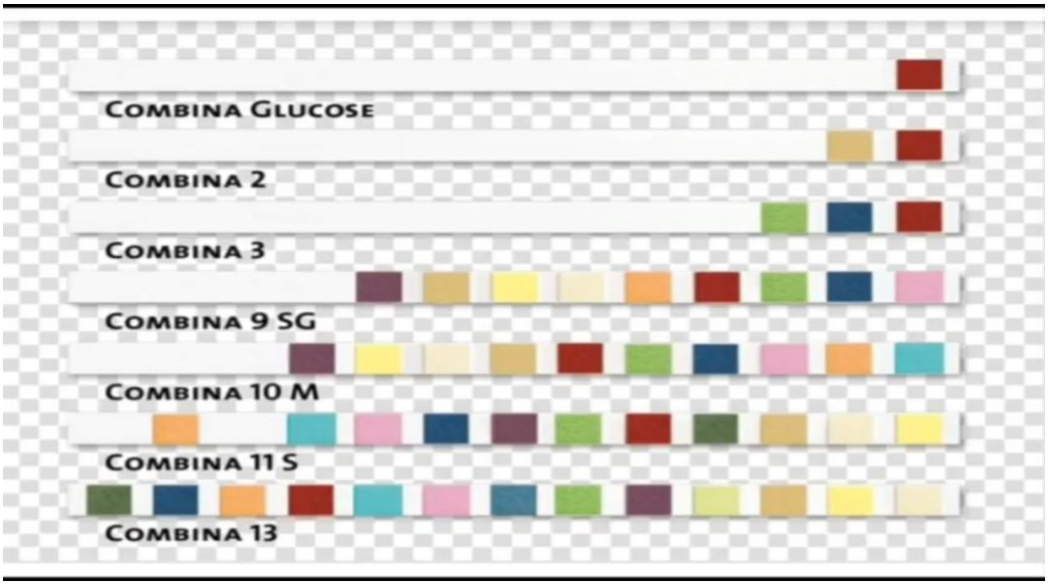

Urine strip for biochemical properties

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