

Enterobacteriaceae

E.coli

Characteristics

- Most significant species in the genus
- Important potential pathogen in humans
- Common isolate from colon flora

Dry, pink (lactose positive) pink colony with area on MacConkey

Ferments glucose, lactose, trehalose, & xylose

Positive indole and methyl red tests

Does NOT produce H₂S

Simmons citrate negative

Usually motile

Manal Alkhulaifi
Voges-Proskauer test negative

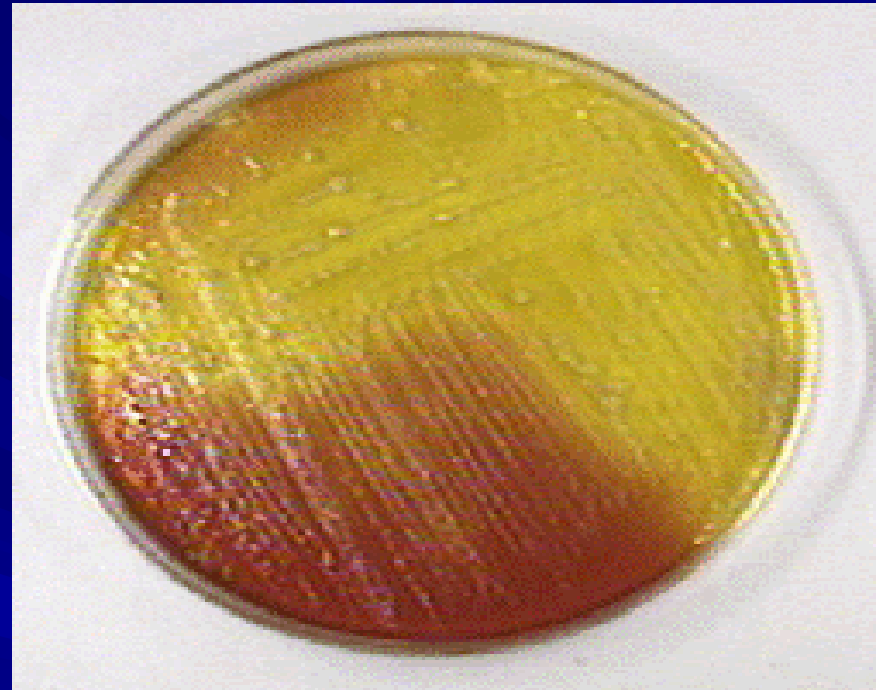
Infections

- Gastrointestinal Infections
- Urinary Tract infection
- Meningitis

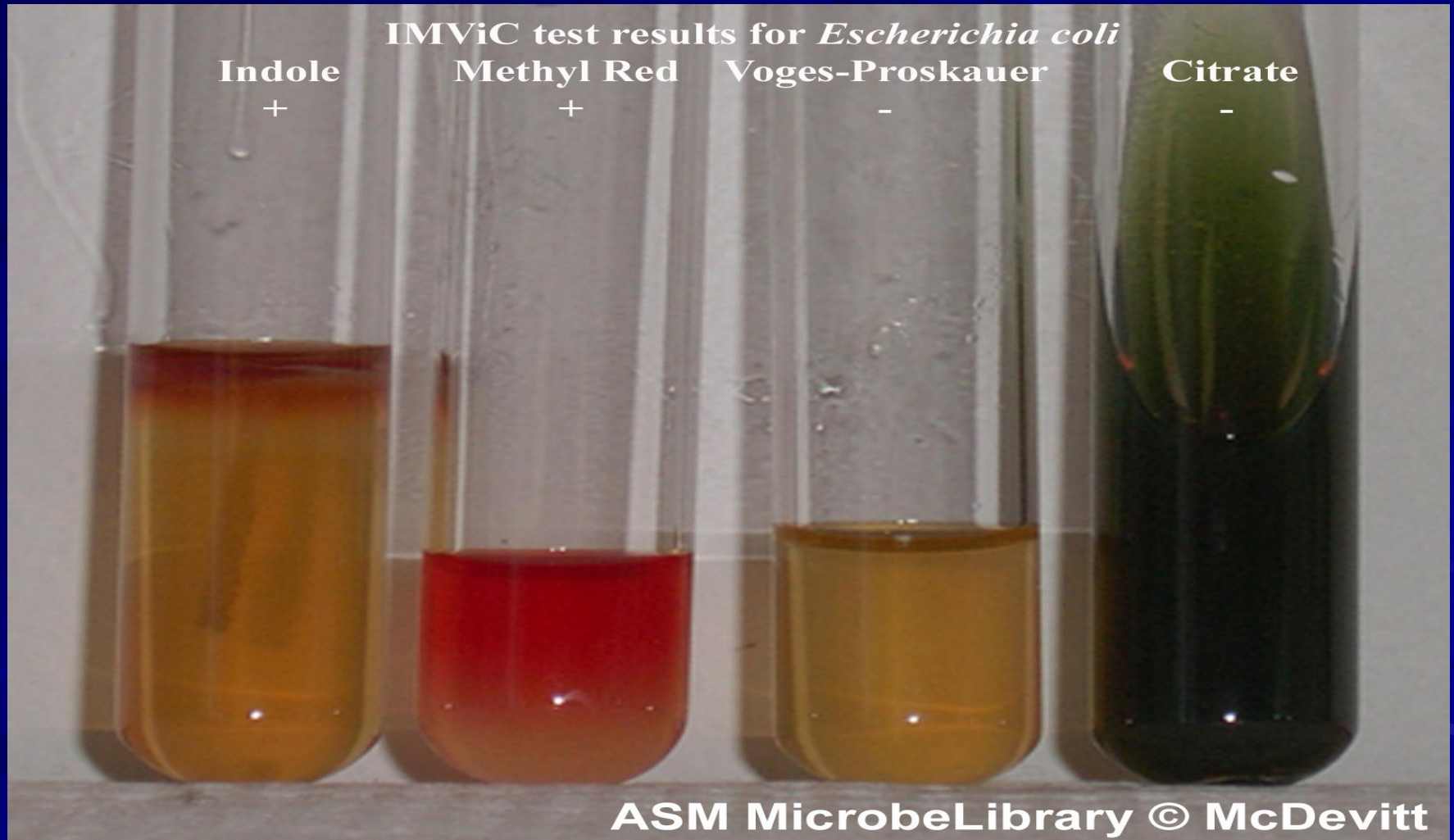


E.coli on XLD agar

On Nutrient agar



IMViC test of *E.coli*



Salmonella

- Gram-negative, motile bacilli
- Found in the intestines and feces of most bird, and mammals
- Currently, most salmonella infections in humans are the result of consumption of food contaminated with animal feces
- Poultry and eggs are particularly common sources of *Salmonella*
- important pathogenic members
 - *S.typhi*-causes typhoid fever
 - *S. paratyphi* A, B & C –cause paratyphoid fevers
 - *S.typhimurium*, *S. montevideo*, *S. wien* -cause salmonellosis
- A complex system of classification of Salmonella based upon antigenic structure exists (Kaufmann-White scheme)

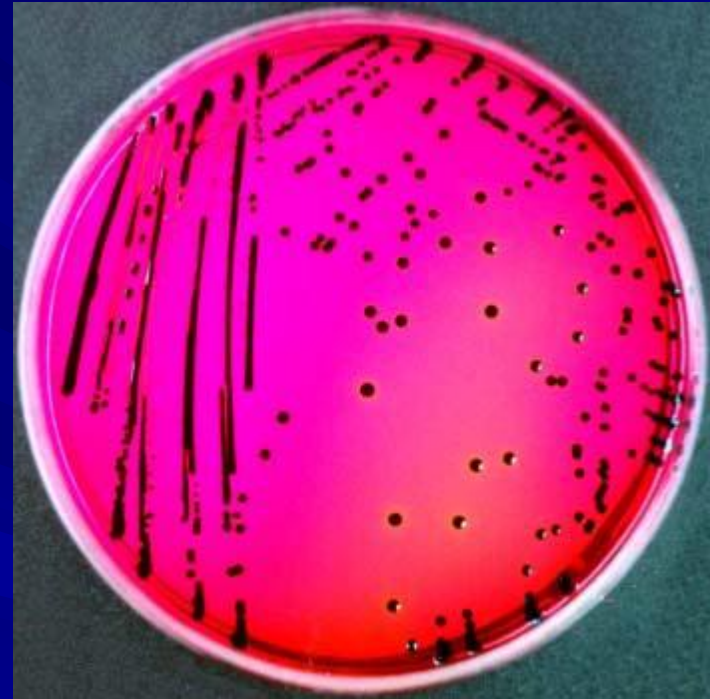
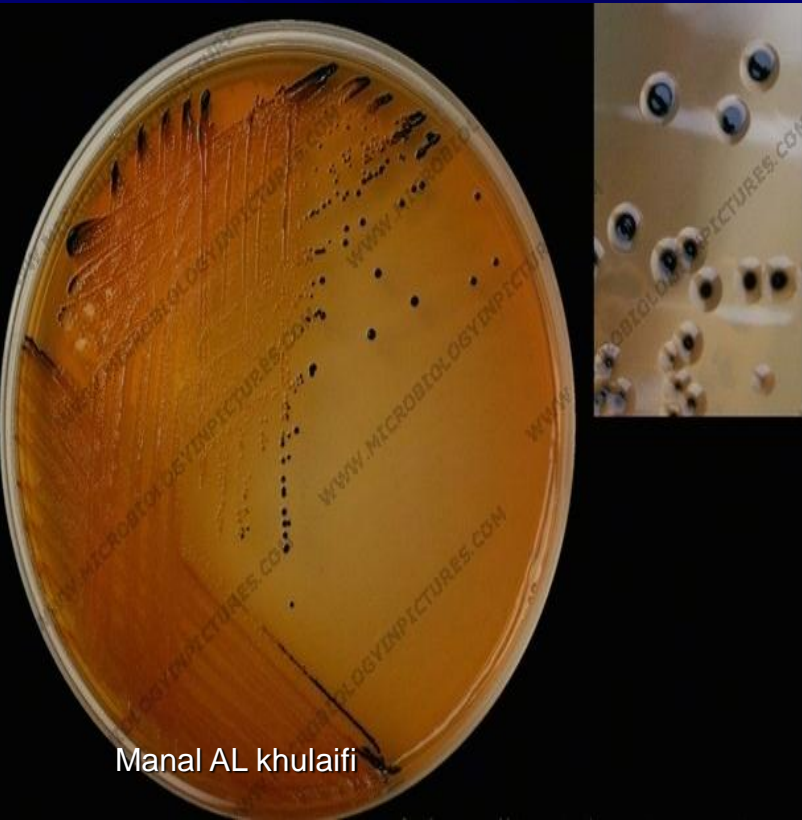


Salmonella typhi

- Humans are the only host
- Causes typhoid fever
- Infection occurs via ingestion of food or water contaminated with sewage containing bacteria from carriers
- Bacteria can pass through the intestines into the bloodstream and into the liver, spleen, bone marrow, and gall bladder
- Bacteria from the gall bladder can reinfect the intestines, producing gastroenteritis and a recurrence of bacteremia

Salmonella on XLD agar

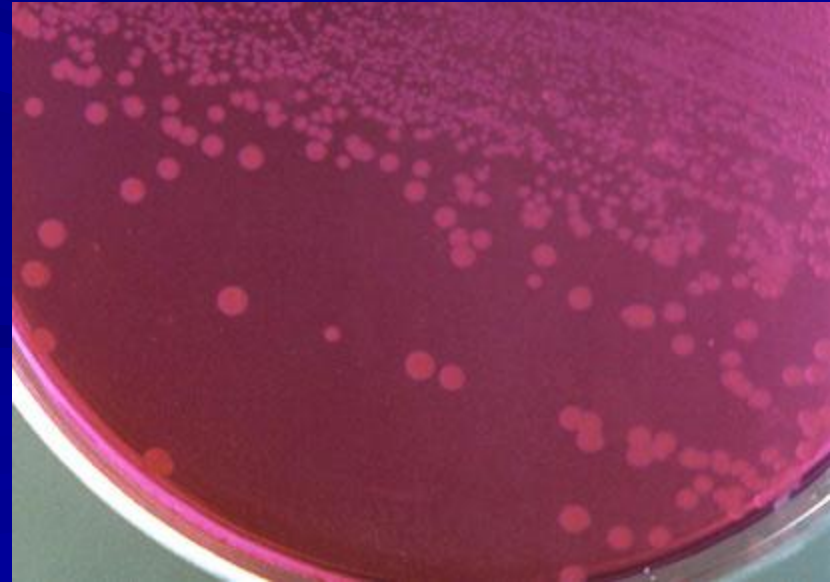
On SS agar



Shigella

- Gram-negative, nonmotile bacteria, nonlactose fermenters
- Primarily a parasite of the digestive tract of humans
- Produce a diarrhea-inducing enterotoxin
- Cause a severe form of dysentery called shigellosis
- 4 well-defined species
 - *S.dysenteriae*-produces a more serious disease than the other species
 - *S. flexneri*-most commonly isolated in developing countries
 - *S.sonnei*-cause a mild form of diarrhea, patients are ambulatory
- Shigellosis is treated with fluid and electrolyte replacement

On XLD agar



Shigella

- Infections are mostly localized to the intestines with formation of microabscesses in the wall of the large intestine and terminal ileum leading to superficial ulceration
- They are highly communicable (foods, fingers feces, flies)
- *Shigella dysenteriae* produces an exotoxin (Shiga toxin) which acts as an enterotoxin and a neurotoxin (meningismus and coma)

Klebsiella

- Usually found in intestinal tract
- Wide variety of infections, primarily pneumonia, wound, and UTI
- General characteristics:
 - Some species are non-motile
 - Simmons citrate positive
 - H₂S negative
 - Some weakly urease positive
 - MR negative; VP positive

Klebsiella species

K. pneumoniae is mostly commonly isolated species

- Possesses a polysaccharide capsule, which protects against phagocytosis
- the colonies moist and mucoid
- Frequent cause of nosocomial pneumonia

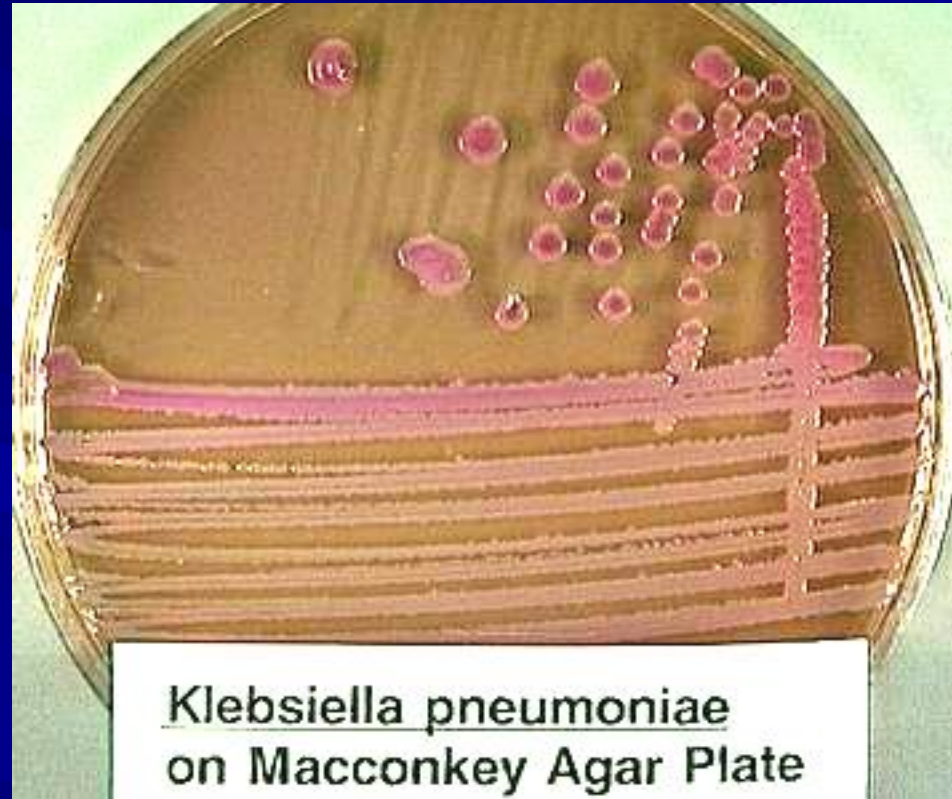
1) Stain & Morphology

- Large gram negative bacilli
- polysaccharide capsule
- Non motile



2) Culture

- Facultative anaerobes, grow on MacConkey's agar & produce rose pink colonies.



2) Culture

- *Klebsiella pneumoniae* is able to cause pneumonia.



On MacKConkey agar

3) Metabolic reactions & Biochemical Tests

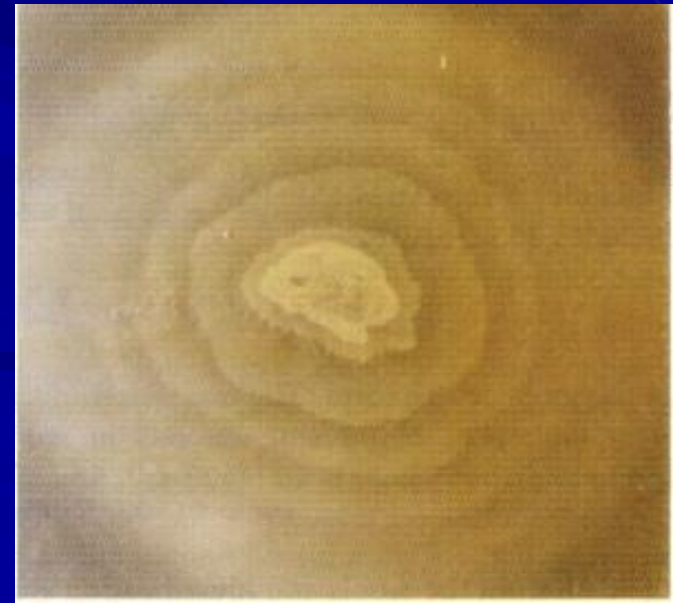


IMVC test

The **IMVC** tests were developed in order to distinguish strains of *Klebsiella* from related species that are Lactose fermenters (**I**ndole, **M**ethyl red, **V**oges-Proskauer, and **C**itrate)

Klebsiella is negative in the first two tests and positive in the second two.

■ Proteus



1) Stain & Morphology



- Gram negative Pleomorphic Bacilli.
- Highly motile

2) Culture

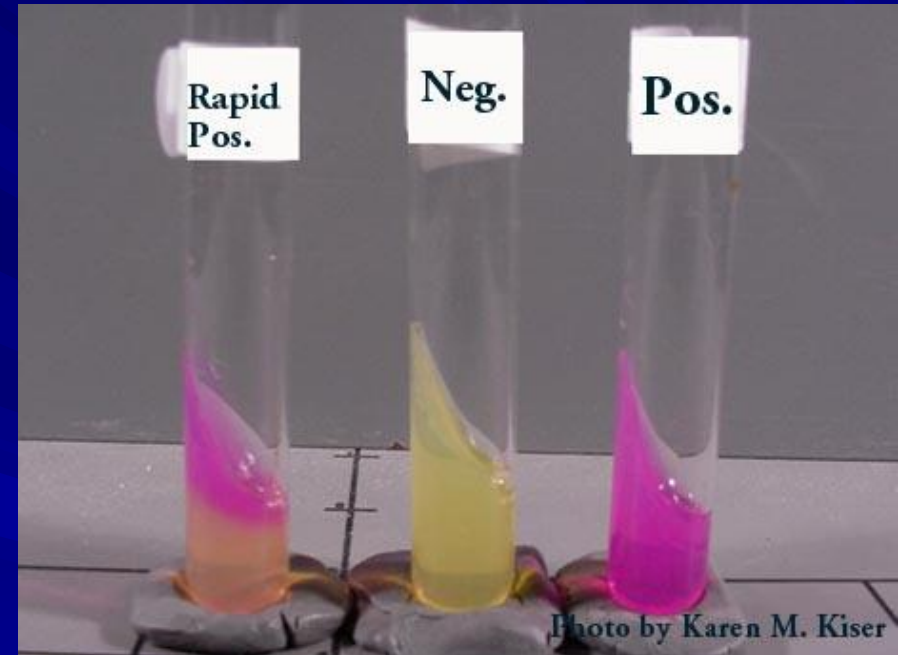
- Grow on MacConkey agar & EMB
- Non Lactose ferment
- Swarming

swarming of *Proteus mirabilis*
on DNase agar

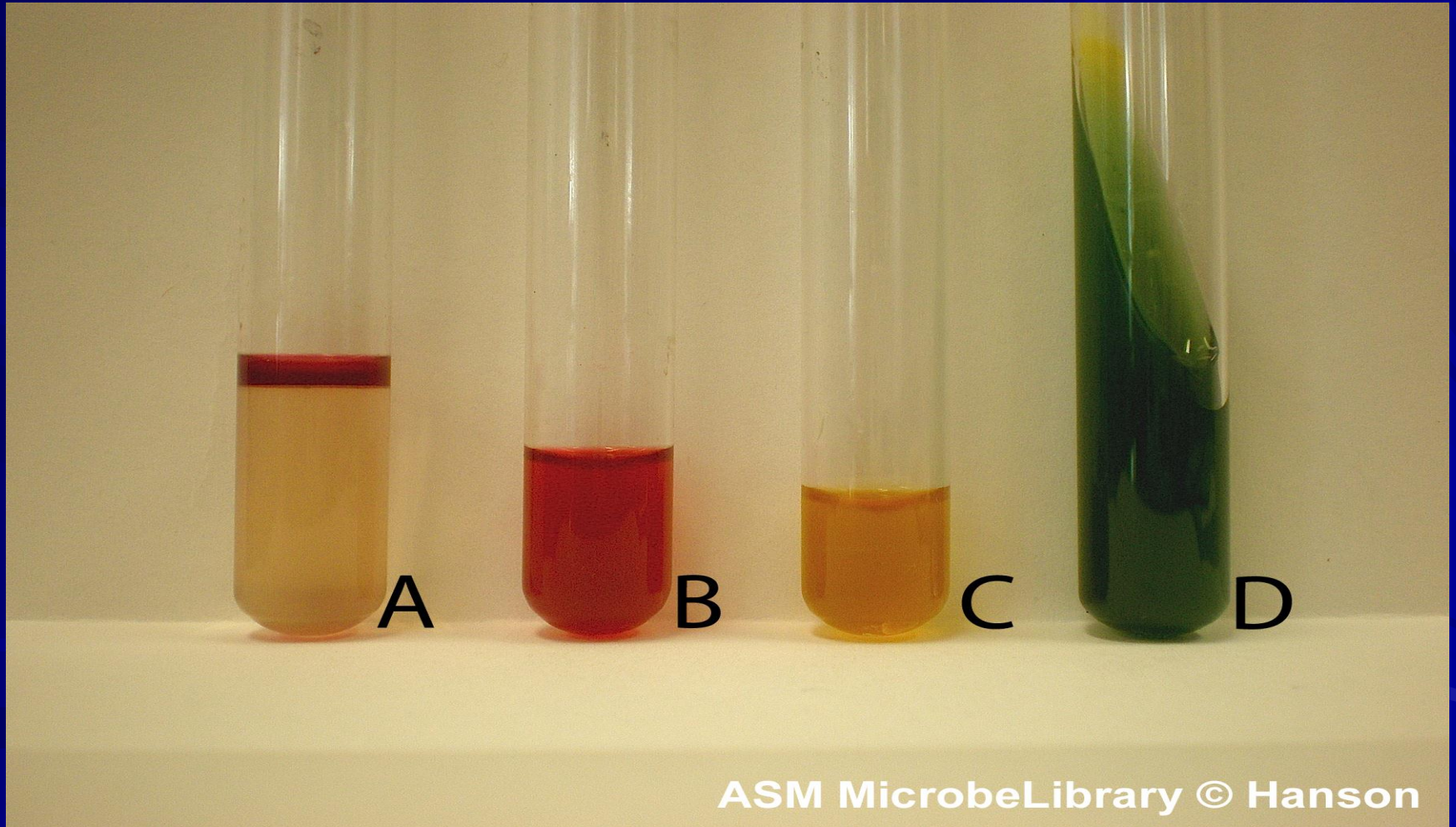


3) Metabolic reactions & Biochemical Tests

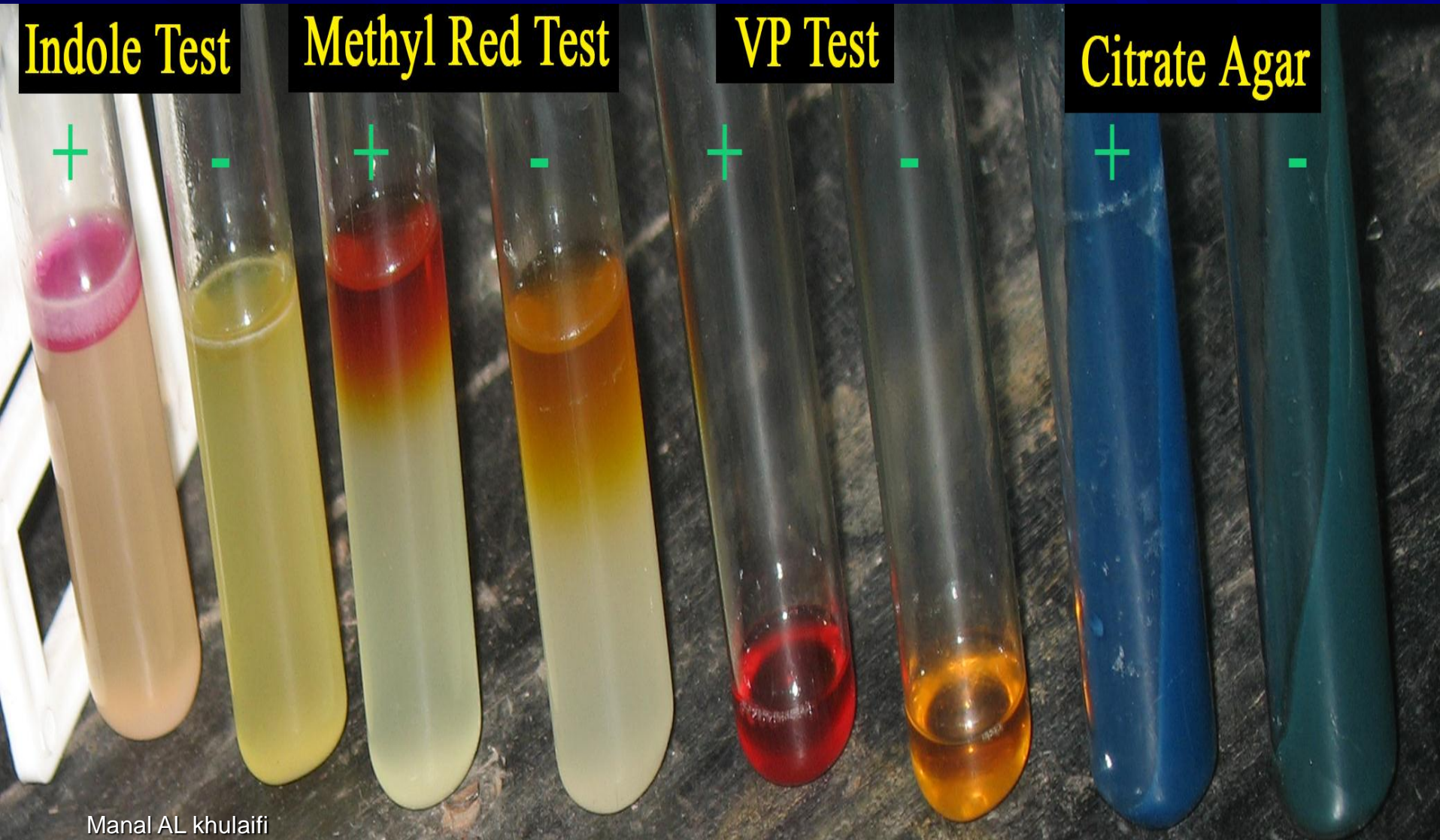
- **Indole:** negative
- **H₂S :** Positive
- **Urease test:** rapid hydrolysis of urea into ammonia changing color from yellow to rose pink color.



IMVic test for *Prtoeus*



IMVIC Test Results



Practical work

- MaKconcey agar
- EMB agar
- XLD agar
- TSI slant
- Urea slant
- Citrate slant
- Indole test
- MR test
- Vp test
- Oxidase test