

Gram Stain Worksheet

A Lead-in. *Practice the pronunciation of the following words:*

pneumonia – pneumococcus – meningitis – bronchitis – bacteria – bacteriuria – pyogenic – fungus – fungi – sputum – urine – epithelial – identify – identification – preparation – gangrene – causative – agent – microbes – microbial – antimicrobial – fusobacteria – spirochetes – diagnosis – diagnostic

B *Read the text and decide if the statements below are true (T) or false (F).*

The Gram stain procedure was originally developed by the Danish pharmacist Hans Christian Gram to differentiate **pneumococci** from *Klebsiella pneumoniae*. The Gram stain is particularly useful in the diagnosis of bacterial **meningitis**, bacterial pneumonia, **bacteriuria**, gonorrhoea, and **pyogenic** infections of the brain, lung, abdomen, pelvis, and wounds.

Statistically about one third of all patients admitted to general hospitals have, or develop, infections, a large proportion of which are caused by bacteria and **fungi**. The Gram-stained smear of a specimen often provides valuable results that cannot be obtained from culture of the specimen alone. The Gram-stained smear is also useful in judging the adequacy of the specimen obtained. In **sputum** and **urine** specimens, for example, a poorly collected or contaminated specimen can be recognised by the presence of many **epithelial** cells in the smear.

Information obtained from the Gram-stained **preparation** rarely permits definitive **identification** of organisms, but usually narrows the possibilities in diseases such as gas **gangrene**, pneumonia or meningitis, which have a variety of **causative** agents. Early diagnostic information obtained from Gram-stained smears often allows the physician to prescribe narrow-spectrum **antimicrobial** therapy, thereby reducing the risk of toxicity or superinfection.

Moreover, in certain infections, such as Vincent's angina (associated with **fusobacteria** and **spirochetes**), the organisms cannot be identified by the culture techniques employed in most **diagnostic** microbiology laboratories, and the Gram-stained smear together with the clinical findings form the basis for diagnosis.

1 *H. C. Gram developed the staining procedure because he had problems with pneumonia.*

2 *Most hospital patients get infected by bacteria or fungi.*

3 *Epithelial cells in the smear mean that the sample is of bad quality.*

4 *Thanks to the data from Gram-stain smear, we can identify a disease precisely.*

5 *In some infections, the Gram-stain smear is the only basis for diagnosis.*

Preparing a smear - video

Listening

A *What are the steps to follow?*

- 1 rinse with water
- 2 rinse with water
- 3 rinse with water
- 4 immediately rinse with water
- 5 dry the slide
- 6 decolourise with alcohol
- 7 put the Gram's iodine on (for 10 sec)
- 8 put safranin on (for 30 sec)
- 9 fix the smear
- 10 flood with crystal violet (for 30 sec)

B *Answer these questions:*

- 1 Why is Gram-stain called differential?
- 2 How long does it take to have a result?
- 3 What type of bacteria is resistant to penicillin?
- 4 Which of the stains is called mordant? What happens if you forget to use it?
- 5 For how long do you put alcohol on the stain?
- 6 What kind of the counter-stain is used here?
- 7 What do you do before you put the stain under the microscope?

Gram Stain : Use of English

The first consideration is the correct _____ (PREPARE) of the smear. Make a thin film of the material on a clean glass slide, using a sterile loop or swab. Air-dry, then heat-fix the slide by passing it several times through a flame. _____ (FAIL) to follow these _____ (DIRECT) may cause staining artefacts and break the normal morphology of bacteria and cells.

The Gram staining _____ (PROCEED) itself involves the _____ (APPLY) of a solution of iodine (potassium iodide) to cells previously stained with crystal violet or gentian violet. The cells are next treated with a _____ (DECOLORIZE) agent such as 95 % ethanol or a _____ (MIX) of acetone and alcohol. While Gram-positive bacteria retain iodine-dye complexes after the _____ (TREAT) with this agent, Gram-negative bacteria do not retain complexes when decolourised. To _____ (VISUAL) decolourised Gram-negative bacteria, a red counterstain such as safranin is used after the decolourisation treatment.

Grammar Point

Verb patterns

53.2 Complete each sentence with one of the following verbs (in the correct form):

-answer	apply	be	forget	listen	live
lose	make	pay	read	try	use

- 1 He tried to avoid answering my question.
- 2 Could you please stop _____ so much noise?
- 3 I enjoy _____ to music.
- 4 I considered _____ for the job, but in the end I decided against it.
- 5 Have you finished _____ the newspaper yet?
- 6 We need to change our routine. We can't go on _____ like this.
- 7 I don't mind you _____ my phone, but please ask me first.
- 8 My memory is getting worse. I keep _____ things.
- 9 I've put off _____ this bill so many times. I really must do it today.
- 10 What a stupid thing to do! Can you imagine anybody _____ so stupid?
- 11 I've given up _____ to lose weight – it's impossible.
- 12 If you gamble, you risk _____ your money.

53.4 Use your own ideas to complete these sentences. Use **-ing**.

- 1 She's a very interesting person. I always enjoy talking to her
- 2 I'm not feeling very well. I don't fancy
- 3 I'm afraid there aren't any chairs. I hope you don't mind
- 4 It was a beautiful day, so I suggested
- 5 It was very funny. I couldn't stop
- 6 My car isn't very reliable. It keeps

54.2 Complete each sentence with a suitable verb.

- 1 Don't forget to lock the door when you go out.
- 2 There was a lot of traffic, but we managed _____ to the airport in time.
- 3 We couldn't afford _____ in London. It's too expensive.
- 4 We've got new computer software in our office. I haven't learnt _____ it yet.
- 5 Mark doesn't know what happened. I decided not _____ him.
- 6 We were all afraid to speak. Nobody dared _____ anything.

54.3 Put the verb into the correct form, **to ...** or **-ing**. (See Unit 53 for verbs + **-ing**.)

- 1 When I'm tired, I enjoy watching television. It's relaxing. (watch)
- 2 I've decided _____ for another job. I need a change. (look)
- 3 Let's get a taxi. I don't fancy _____ home. (walk)
- 4 I'm not in a hurry. I don't mind
- 5 Tina ran in a marathon last week, but she failed
- 6 I wish that dog would stop It's driving me crazy. (bark)
- 7 Our neighbour threatened the police if we didn't stop the noise. (call)
- 8 We were hungry, so I suggested dinner early. (have)
- 9 Hurry up! I don't want to risk the train. (miss)
- 10 They didn't know I was listening to them. I pretended asleep. (be)