Grade 11 Chemistry

Term 3 - 52 complete lesson plans

Ready to teach, in the KICD lesson-plan format | 40-minute lessons | PDF and editable Word

ABOUT THIS PACK

52 complete, ready-to-teach Grade 11 Chemistry lesson plans for Term 3, covering reaction rates and hydrocarbons.

TOPICS IN THIS PACK

Topic	Name	Lessons
2.3	Reaction Rates	26
3.1	Hydrocarbons	26

INSIDE EVERY LESSON PLAN

- The specific learning outcomes, key inquiry question, core competencies, values and PCIs, and the resources needed.
- A timed lesson flow: what the teacher does and what the learners do, from introduction to summary.
- The key content (a worked example, notes or a practical with its expected results), then four practice questions with the answers for the teacher.
- The common mistake to watch for, and ideas for learners who need support and for those ready for more.
- A four-level CBC assessment rubric (EE, ME, AE, BE), homework, and a blank reflection space to fill in after teaching.

A TASTE OF LESSON 1

Rate of reaction and the kinetic theory

By the end of the lesson, the learner should be able to: a) define the rate of a reaction; b) give examples of fast and slow reactions

> **Rate of reaction**
> The RATE OF REACTION is the change in the amount (or concentration) of a reactant or product per unit time.
> Example units: cm^3 of gas per second, g per minute, mol/dm^3 per second.
> Fast reactions: explosions, burning of petrol, precipitation (silver chloride forms instantly). Moderate: magnesium with acid, baking. Slow: rusting of iron, ripening and rotting of fruit, weathering of rocks, formation of crude oil (millions of years).

You also receive this pack as an editable Word file, so you can change any lesson to suit your class before you print it. Lessons follow the order of the KICD curriculum design.

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Rate of reaction and the kinetic theory

Strand 2.0 Physical Chemistry > Sub-strand 2.3 Reaction Rates | Lesson 1 of 26 | 40 minutes

SCHOOL	TEACHER	DATE
CLASS / STREAM	TIME	ROLL (B / G)

SPECIFIC LEARNING OUTCOME(S)

By the end of the lesson, the learner should be able to: a) define the rate of a reaction; b) give examples of fast and slow reactions

KEY INQUIRY QUESTION(S)

- Why do some reactions happen in seconds while others take days or even years?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

COMPETENCY	**Communication and collaboration**	Learners explain their thinking to a partner and report their findings to the group.
COMPETENCY	**Critical thinking and problem solving**	Learners choose a method, check their answers and give reasons for their choices.
VALUE	**Unity**	Learners share materials fairly and work as one team.
PCI	**Financial literacy**	Examples use shillings and cents, shopping, saving and simple budgets.

LEARNING RESOURCES

Charts of energy profile diagrams and rate graphs | Simulations of collisions and equilibrium (if available) | Graph paper, rulers, calculators | Notebooks and pencils

ORGANISATION OF LEARNING

Groups of four for rate experiments (roles: timer, reader, recorder, reporter), sharing apparatus fairly; pairs for graphs; teacher demonstrations for toxic or staining reagents.

KEY WORDS

rate of reaction | collision theory | effective collision | activation energy | energy profile diagram | exothermic | endothermic | catalyst | surface area | concentration | reversible reaction | dynamic equilibrium | Le Chatelier's principle | yield | Haber process | Contact process | Ostwald process

THE LESSON AT A GLANCE

Introduction	Teacher models	Guided practice	On their own	Wrap-up
6 min	9 min	10 min	9 min	6 min

LESSON FLOW

Stage	Minutes	The teacher	The learners
Introduction	6	Greet the class and ask: "Why do some reactions happen in seconds while others take days or even years?" Take two or three answers, link them to earlier work, then state today's outcome.	Answer the starter question, recall what they already know and read the outcome aloud.
Step 1: Teacher models	9	Take learners through "Rate of reaction" (key ideas on the next page), explaining as you go. Use charts of energy profile diagrams and rate graphs, simulations of collisions and equilibrium (if available), graph paper, rulers, calculators. Ask learners to predict what comes next before you show it.	Watch, predict the next step, ask questions and note the key steps in their exercise books.
Step 2: Guided practice	10	Give questions 1 and 2. Move round the groups, ask "How do you know?" and correct errors kindly on the spot.	Work in pairs or small groups, explain each step to a partner and check one another's answers.
Step 3: Independent practice	9	Set questions 3 and 4 for individual work. Mark as you walk round and note who needs help in the next lesson.	Work on their own, then swap books with a partner to check.
Summary and conclusion	6	Ask two or three learners to state the key idea in their own words. Give this exit question and check the answers: "10 g of a reactant is used up in 5 minutes. Find the average rate."	Say the key idea in their own words and answer the exit question in the exercise book.

KEY IDEAS

Rate of reaction

The RATE OF REACTION is the change in the amount (or concentration) of a reactant or product per unit time.

Example units: cm^3 of gas per second, g per minute, mol/dm^3 per second.

Fast reactions: explosions, burning of petrol, precipitation (silver chloride forms instantly). Moderate: magnesium with acid, baking. Slow: rusting of iron, ripening and rotting of fruit, weathering of rocks, formation of crude oil (millions of years).

Review of the kinetic theory: particles of reactants are always moving; they move faster when heated; in solids they vibrate in fixed positions, in liquids and gases they move about freely.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	Define rate of reaction.	**The change in amount of a reactant or product per unit time.**
2	Give an example of a very slow reaction.	**For example: rusting, weathering of rocks.**
3	Give a unit for rate when a gas is produced.	**cm^3 per second (cm^3/s).**
4	10 g of a reactant is used up in 5 minutes. Find the average rate.	**10 ÷ 5 = 2 g per minute.**

WATCH OUT FOR

Learners confuse rate with amount of product. Rate is about time.

ASSESSMENT RUBRIC - THE FOUR CBC LEVELS

Level	What the learner can do
Exceeds expectations (EE)	Can define the rate of a reaction confidently and accurately, explain the method used, and apply the idea to new or unfamiliar problems.
Meets expectations (ME)	Can define the rate of a reaction accurately in familiar situations; notices and corrects slips without help.
Approaches expectations (AE)	Can partly define the rate of a reaction, or does so with prompts from the teacher or a partner; makes some errors.
Below expectations (BE)	Cannot yet define the rate of a reaction without direct help; needs the idea taught again with concrete objects.

SUPPORT AND EXTENSION

Learners who need support	Give a fast-slow sorting card.
Learners ready for more	Why is it useful for industry to control reaction rates? (Answer: To make products quickly and safely while saving energy and money)
Inclusion	Seat learners with low vision near the board and read aloud whatever you write; use large, clear, tactile materials; allow extra time; pair with a patient partner; use gestures or Kenyan Sign Language for the key words.

HOMEWORK AND FOLLOW-UP

Redo questions 3 and 4 neatly in the exercise book. Then tell someone at home what you learned about "rate of reaction and the kinetic theory" and bring one question of your own to ask next lesson.

TEACHER SELF-CHECK

- Did every learner get a turn to handle materials or explain their thinking?
- Did most learners meet the outcome? Write down the names of those who did not.
- Was the pace right — did any step take too long or too short a time?
- Which competency and value did I see learners showing?
- What will I change the next time I teach this lesson?

REFLECTION ON THE LESSON / SELF-REMARKS

Write this after teaching - what worked, what to change, which learners need follow-up.

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Collision theory and activation energy

Strand 2.0 Physical Chemistry > Sub-strand 2.3 Reaction Rates | Lesson 2 of 26 | 40 minutes

SCHOOL	TEACHER	DATE
CLASS / STREAM	TIME	ROLL (B / G)

SPECIFIC LEARNING OUTCOME(S)

By the end of the lesson, the learner should be able to: a) explain the collision theory; b) define activation energy

KEY INQUIRY QUESTION(S)

- Why do some reactions happen in seconds while others take days or even years?

CORE COMPETENCIES, VALUES AND PCIS IN THIS LESSON

COMPETENCY	**Communication and collaboration**	Learners explain their thinking to a partner and report their findings to the group.
COMPETENCY	**Critical thinking and problem solving**	Learners choose a method, check their answers and give reasons for their choices.
VALUE	**Unity**	Learners share materials fairly and work as one team.
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KEY WORDS

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THE LESSON AT A GLANCE

Introduction	Teacher models	Guided practice	On their own	Wrap-up
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LESSON FLOW

Stage	Minutes	The teacher	The learners
Introduction	6	Greet the class and ask: "Particles in a gas collide billions of times each second. Why doesn't every gas mixture react instantly?" Take two or three answers, link them to earlier work, then state today's outcome.	Answer the starter question, recall what they already know and read the outcome aloud.
Step 1: Teacher models	9	Take learners through the key ideas on the next page, explaining as you go. Use charts of energy profile diagrams and rate graphs, simulations of collisions and equilibrium (if available), graph paper, rulers, calculators. Ask learners to predict what comes next before you show it.	Watch, predict the next step, ask questions and note the key steps in their exercise books.
Step 2: Guided practice	10	Give questions 1 and 2. Move round the groups, ask "How do you know?" and correct errors kindly on the spot.	Work in pairs or small groups, explain each step to a partner and check one another's answers.
Step 3: Independent practice	9	Set questions 3 and 4 for individual work. Mark as you walk round and note who needs help in the next lesson.	Work on their own, then swap books with a partner to check.
Summary and conclusion	6	Ask two or three learners to state the key idea in their own words. Give this exit question and check the answers: "Why does a match need striking before it burns?"	Say the key idea in their own words and answer the exit question in the exercise book.

KEY IDEAS

COLLISION THEORY: for a reaction to happen, reactant particles must COLLIDE, and the collision must have enough energy (at least the ACTIVATION ENERGY) and the right orientation. Collisions that lead to reaction are EFFECTIVE (successful) collisions.

ACTIVATION ENERGY (Ea) is the minimum energy colliding particles need to react - like a hill to climb before rolling down the other side.

Rate depends on the number of EFFECTIVE COLLISIONS per second. Anything that increases how often particles collide, or the fraction with enough energy, increases the rate.

Simulation or model: shake a tray of beads gently and then strongly; only "hard" collisions count.

PRACTICE QUESTIONS - WITH ANSWERS FOR THE TEACHER

No.	Question	Answer
1	State the collision theory.	**Particles must collide with at least the activation energy (and right orientation) to react.**
2	Define activation energy.	**The minimum energy that colliding particles need to react.**
3	What is an effective collision?	**A collision that results in a reaction.**
4	Why does a match need striking before it burns?	**Friction supplies the activation energy.**