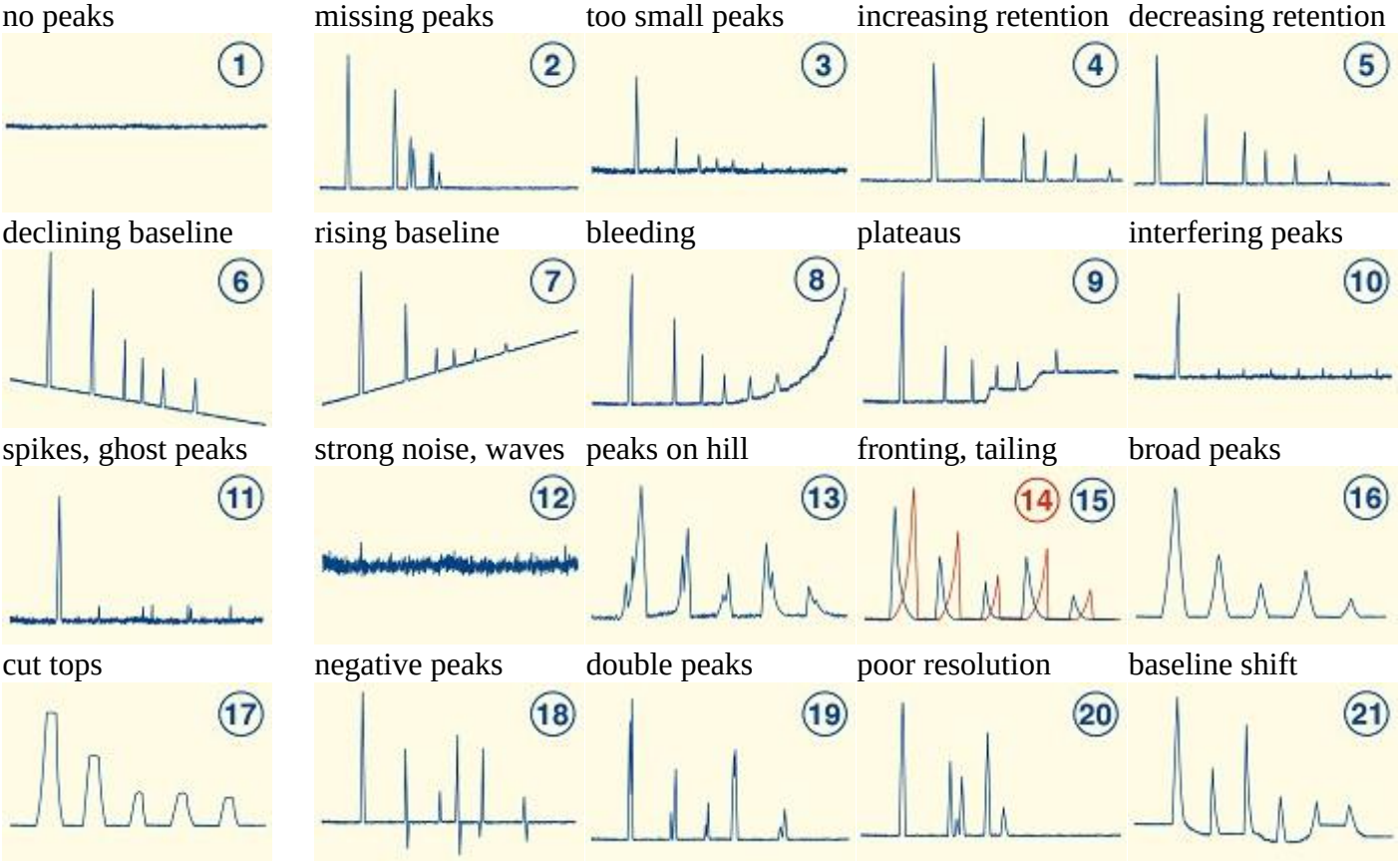
GC Troubleshooting

We can help you.

1. Observation: no peaks

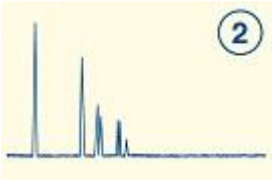


1.Observation no peak

Possible causes	Suggested remedy
1. error in the detector power supply / electronics.	1. check detector/electronic power supply and cables.
2. no FID flame.	2. check FID; reignite it.
3. syringe defective / clogged.	3. use a different syringe or clean it.
4. temperature too low for the analytes, oven heating faulty.	4. check temperature program, oven temperature.
5. detector / software / computer hardware failure.	5. check integrator, cables; restart computer.
6. no gas flow.	6. check gas tubes, valves, seals; test gas flow; shorten front of GC column, change injection septum.
7. column connection leaks.	7. use new ferrules.
8. broken GC column.	8. if breakage is at the beginning or at the end, remove the short piece; breakage in the middle can be mended with a glass

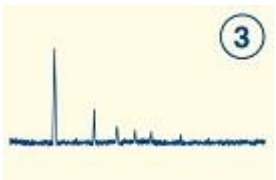
	connector; for multiple breakages: replace column.

2. Observation: Missing or overlapping peaks, poor separation efficiency

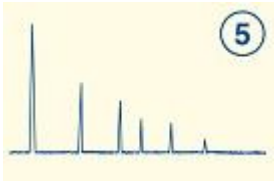


Possible causes	Suggested remedy
1. syringe defective / clogged.	1. use a different syringe or clean it.
2. sample too diluted.	2. increase injection volume; concentrate sample.
3. sample concentration too high.	3. decrease injection volume; dilute sample.
4. column connection leaks, column not properly installed	4. check column installation; search for leaks; replace ferrules.
5. perforated injection septum.	5. replace septum.
6. injector temperature too low.	6. check temperature program; increase injector temperature.
7. sample decomposes in the injector.	7. check temperature program; reduce injector temperature; replace liner; check capillary ends.
8. column oven too hot.	8. check temperature program, oven temperature (external thermometer); decrease temperature.
9. incorrect flow rate.	9. measure flow, control and adjust it if necessary.
10. column absorbs or decomposes analytes.	10. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column; if column test does not show any defects: a) use a column with thicker film b) use phase with better deactivation c) use column with special selectivity

3. Observation: Peaks too small, poor quantification, concentrations not reproducible

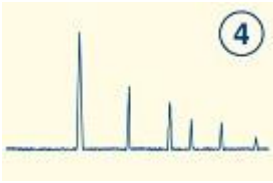


Possible causes	Suggested remedy
1. dirty syringe.	1. use a different syringe or clean it.
2. concentration of sample too low.	2. increase injection volume; concentrate sample.
3. split too high.	3. reduce split.
4. sensitivity of detector too low.	4. inject standard in order to test detector



Possible causes	Suggested remedy
	sensitivity.
5. column connection leaks, column not properly installed.	5. check column installation; search for leaks; replace ferrules.
6. injector temperature too low.	6. check temperature program, increase injector temperature.
7. dirty ECD.	7. clean ECD.
8. FID, TCD gas flow too low.	8. correct flow according to manufacturers' instructions.
9. sample decomposes.	9. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column; if column test does not show any defects: a) use a column with thicker film b) use phase with better deactivation c) use column with special selectivity.

4. Observation: Increased or differing retention times / low gas flow

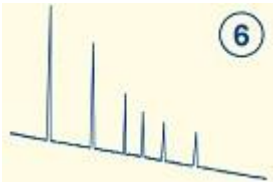


Possible causes	**Suggested remedy**
1. speed of gas too low.	1. increase flow.
2. column connection leaks, column not properly installed.	2. check column installation; search for leaks; replace ferrules.
3. oven temperature too low or unstable.	3. check temperature program, oven temperature (external thermometer); if the analytes are stable, increase temperature.
4. strong decrease of gas pressure.	4. replace septum; for an instrument with pressure / temperature control, flow pressure must be higher than 15 psi above the demand at max. temperature of the program.
5. tubes / capillaries / column constricted or blocked.	5. compare flow at column entrance and outlet with preset flow; check and / or clean gas tubes; in case of pressure build-up cut and remove one turn (20 cm) from the column or replace column.

5. Observation: Decreased or differing retention times

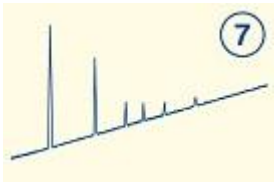
1. speed of gas too high.	1. compare flow at column entrance and outlet with preset flow; check gas tubes and pressure gauge; control parameter settings; or replace column.
2. oven temperature too high.	2. check temperature program, oven temperature (external thermometer); decrease temperature.
3. column length too short.	3. replace column.
4. film thickness in column too low.	4. replace column.

6. Observation: Constantly declining baseline



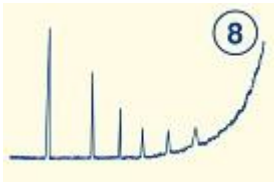
Possible causes	Suggested remedy
1. gas flow changes with temperature gradient.	1. check gas content in gas cylinder; pressure must be a few bar above the required pressure at max. temperature; otherwise exchange gas cylinder.
2. contaminated gas/ poor gas quality (at constant inlet pressure).	2. check gas supply.
3. column not properly installed.	3. check column installation (FID).

7. Observation: Constantly rising baseline



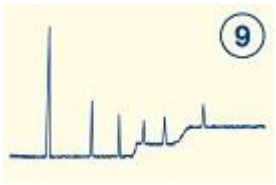
Possible causes	Suggested remedy
1. leak at column entrance or injection septum.	1. check column installation; search for leaks; replace ferrules.
2. injector contaminated.	2. make a run at lower injector temperature; if the baseline improves, replace liner, use low bleed or high temperature septa.
3. column contaminated.	3. cut two turns from column entrance; rinse column with solvent (only chemically bonded phases); otherwise replace column or use guard column.
4. detector contaminated.	4. clean detector.
5. increase of temperature too fast.	5. decrease temperature gradient and end temperature.
6. poor gas quality.	6. use gas grades recommended for GC; for longer supply lines from gas source to GC use gas purification cartridges directly connected to the GC.

8. Observation: Increasing baseline, at high temperature bleeding or noise



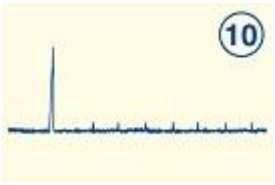
Possible causes	Suggested remedy
1. decomposition of the stationary phase.	1. check for leaks; matrix check for compatibility with the column.
2. column contaminated.	2. cut two turns from column entrance; rinse column with solvent (only chemically bonded phases); otherwise replace column or use guard column.
3. increase of temperature too fast / end temperature too high.	3. decrease temperature gradient and end temperature.
4. column not properly conditioned.	4. condition column according to manufacturers' instructions (while column is not connected to the detector).
5. detector contaminated.	5. clean detector according to manufacturers' instructions.
6. poor gas quality.	6. use gas grades recommended for GC; for longer supply lines from gas source to GC use gas purification cartridges directly connected to the GC.

9. Observation: Plateaus at certain temperatures



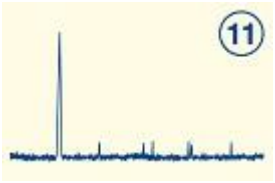
Possible causes	Suggested remedy
1. steps in temperature program too drastic.	1. avoid very short and strong heating periods.

10. Observation: Regular interfering peaks



Possible causes	Suggested remedy
1. poor gas quality.	1. use gas grades recommended for GC; for longer supply lines from gas source to GC use gas purification cartridges directly connected to the GC.
2. FID: dust or contaminants in the detector.	2. clean detector; if particles are visible in the column or column ends are not cut precisely (frayed edges), cut two turns from the column entrance.
3. electronic defect, damaged cable or detector.	3. replace cable, contact your GC manufacturer.
4. bleeding of silicon septa.	4. replace injection septum, use low bleed or high temperature septa.

11. Observation: Irregular interfering peaks, spikes, ghost peaks



Possible causes	Suggested remedy
1. contamination from vials / septa or sample preparation.	1. control SPE and / or autosampler vials; use low bleed or high temperature septa.
2. derivatization not quantitative.	2. check derivatization protocol; use more reactive derivatization reagents.
3. dirty syringe.	3. use a different syringe or clean it.
4. sample decomposes.	4. check temperature program, oven temperature (external thermometer); if analytes are not temperature-stable, reduce injector temperature; replace liner.
5. column absorbs or decomposes analytes.	5. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column; if column test does not show any defects: a) use a column with thicker film b) use phase with better deactivation c) use column with special selectivity.
6. sample volume too high, double injection.	6. reduce sample volume or add a blank run after a high volume injection.
7. poor gas quality.	7. use gas grades recommended for GC; for longer supply lines from gas source to GC use gas purification cartridges directly connected to the GC.

12. Observation: Strong noise, waves

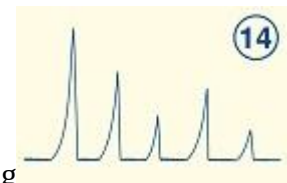
Possible causes	Suggested remedy
1. leak at column entrance or injection septum.	1. check column installation; search for leaks; replace ferrules.
2. bleeding of septum / injector contaminated.	2. make a run with lower injector temperature; if the baseline improves, replace liner, use low bleed or high temperature septa.
3. septum particles in column entrance.	3. cut 1 turn from column entrance; replace injection septum.
4. column contaminated.	4. cut two turns from column entrance; rinse column with solvent (only chemically bonded phases); otherwise replace column or use guard column.

5. column not properly conditioned.	5. condition column according to manufacturers' instructions (while column is not connected to the detector).
6. hardware defect.	6. check temperature program, oven temperature (external thermometer); contact your GC manufacturer.
7. detector contaminated (electronics).	7. clean detector according to manufacturers' instructions; check electronics.
8. increase of temperature too fast.	8. decrease temperature gradient and end temperature.
9. poor gas quality.	9. use gas grades recommended for GC; for longer supply lines from gas source to GC use gas purification cartridges directly connected to the GC.

13. Observation: Small peaks on fronting or tailing of bigger peaks

Possible causes	Suggested remedy
1. column not properly installed.	1. check capillary ends; check tight and correct fit in injector and detector.
2. temperature of injection too low.	2. check injector temperature; if analytes are stable, increase temperature.
3. solvent not compatible with GC phase.	3. change solvent.
4. splitter defect.	4. measure flow and adjust splitter.
5. poorly deactivated column, film thickness too low.	5. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column.

14. Observation: Fronting (strong broadening in the ascending part)

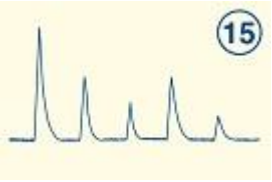
Fronting 

Possible causes	Suggested remedy
1. column overload.	1. decrease injection volume; dilute sample.
2. sample vaporizes too slowly, not evenly or condenses.	2. increase injector temperature (consider max. temperature limits of the column).
3. analytes coelute.	3. change temperature program or use column with different selectivity.
4. sample decomposes.	4. check temperature program, oven

	temperature (external thermometer); if analytes are not temperature-stable, reduce injector temperature; replace liner.
5. column absorbs or decomposes analytes.	5. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column; if column test does not show any defects: a) use a column with thicker film b) use phase with better deactivation c) use column with special selectivity.

15. Observation: Tailing (strong broadening in the descending part)

Tailing

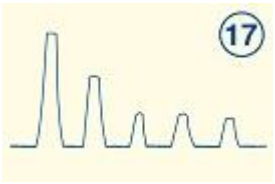


Possible causes	Suggested remedy
1. sample vaporizes too slowly, not evenly or condenses.	1. increase injector temperature (consider max. temperature limits of the column).
2. high-boiling analytes.	2. derivatize polar, basic or high-boiling compounds.
3. system leaks.	3. check column installation; search for leaks; replace ferrules.
4. analytes coelute.	4. change temperature program or use column with different selectivity.
5. sample decomposes.	5. check temperature program, oven temperature (external thermometer); if analytes are not temperature-stable, reduce injector temperature; replace liner by a deactivated one.
6. column absorbs or decomposes analytes.	6. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column; if column test does not show any defects: a) use a column with thicker film b) use phase with better deactivation c) use column with special selectivity.
7. split rate too low.	7. increase split rate.
8. analytes always tending to tail.	8. no chance for symmetric peaks.
9. column overload.	9. decrease injection volume; dilute sample.

16. Observation: Broad peaks

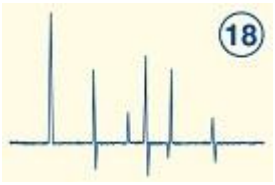
Possible causes	Suggested remedy
1. poor focussing.	1. decrease start temperature of the program.
2. flow too high or too low.	2. measure flow, control and adjust it if necessary.
3. split rate too low.	3. increase split rate.
4. column overloaded.	4. decrease injection volume, dilute sample or increase split flow.

17. Observation: Cut tops of peaks, broad peaks



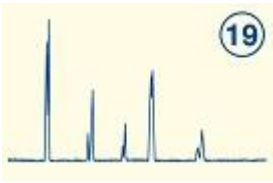
Possible causes	Suggested remedy
1. detector overloaded.	1. decrease injection volume; dilute sample; increase the split flow.
2. column overloaded.	2. decrease injection volume; increase split flow.
3. zero point is outside the display.	3. change scale.

18. Observation: Negative peaks, negative signals



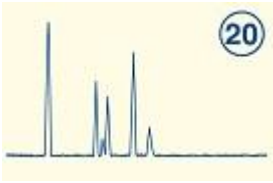
Possible causes	Suggested remedy
1. polarity of integrator is inverted.	1. invert polarity at the instrument.
2. column overload.	2. decrease injection volume; dilute sample / increase split rate.
3. pressure fluctuations.	3. check gas tubes, valves, seals; test gas flow; change injection septum; contact hardware manufacturer.
4. detector contaminated.	4. clean detector as specified by the manufacturer.
5. electronic artefacts.	5. check detector, A/D converter.

19. Observation: Double peaks, doubled peak tops



Possible causes	Suggested remedy
1. solvent and column not compatible.	1. change solvent or use guard column.
2. solvent mixtures with large differences in boiling point and polarity.	2. use just one solvent.
3. sample decomposes.	3. check temperature program, oven temperature (external thermometer); if analytes are not temperature-stable, reduce injector temperature; replace liner by a deactivated one.
4. analytes coelute.	4. modify temperature program or use longer column; possibly change column polarity.
5. detector overload.	5. inject less; control make-up flow.

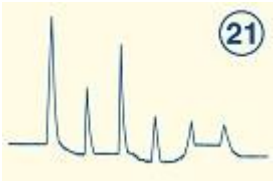
20. Observation: Short lifetime, poor resolution, lack of separation efficiency



Possible causes	Suggested remedy
1. impurities on the column.	1. cut two turns from column entrance; rinse column with solvent (only chemically bonded phases); otherwise replace column or use guard column.
2. contamination from vials / septa or sample preparation.	2. check SPE and / or autosampler vials; use low bleed or high temperature septa.
3. polymerization on the column.	3. use guard column (at least 10 m).
4. separation efficiency decreases for repeated injections, improves after reconditioning.	4. use guard column; reduce injection volume; modify temperature program; for repeated injections increase end temperature (if possible) and use longer temperature program.
5. temperature too high / temperature increase too fast.	5. decrease oven temperature and / or temperature gradient (should not be higher than 25 °C/min).
6. cooling too fast.	6. do not open oven door at high temperatures.
7. temperature too low / condensation.	7. increase injector temperature and/or start temperature.
8. poor deactivation.	8. check capillary ends; check intact deactivation using the test mixture; for poor results shorten both column ends by about 10 cm; or replace column; if column test does not show any defects:

	a) use a column with thicker film b) use phase with better deactivation c) use column with special selectivity.
9. oxygen / air in the system.	9. use oxygen absorber or gas grade with less oxygen.
10. water content too high.	10. reduce water content.
11. head-space analysis: permanent air injections.	11. displace oxygen from vials with an inert gas.

21. Observation: Baseline increases or decreases before or after a peak



Possible causes	**Suggested remedy**
1. injection volume too high.	1. decrease injection volume; dilute sample; clean injection system.
2. column bleeding due to poor conditioning.	2. condition column according to manufacturers' instructions (while column is not connected to the detector).
3. pressure fluctuations.	3. check gas tubes, valves, seals; test gas flow; change injection septum; contact hardware manufacturer.
4. injector temperature too low.	4. check injector temperature; if the analytes are stable, increase temperature.
5. injection septum perforated.	5. replace septum.
6. wrong TCD gas flow.	6. adjust flow according to manufacturers' instructions.